

Final Report to
U.S. ARMY CORPS OF ENGINEERS

**INVENTORY OF FORMERLY USED DEFENSE SITES:
SITE 3A NO. H09HI0467
OFFSHORE WATERS, HONOLULU, HAWAII**

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for Final Report

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1.0 INTRODUCTION

Environmental surveys for the selection of new dredge spoil disposal sites undertaken in 1975-1977 in the offshore waters just south of Honolulu and Pearl Harbor, Hawaii, led to the inadvertent collection of significant quantities of unexploded military ordnance. Several researchers and crew members were seriously injured by leaking canisters of toxic liquids believed to be mustard gas and some 1500 pounds of unexploded ordnance were recovered in bottom trawls. In the interest of determining if additional ordnance was present in the offshore waters, and the responsibility and possible need for cleanup action, an inventory of the sea floor was initiated using side-scan sonar and video photography of the two sites where unexploded ordnance had been recovered.

1.1 Project Description

Background. The nearshore ocean waters of the south shore of Oahu have long been used as disposal areas for dredge spoil and various types of wastes, both military and civilian. Prior to 1972, disposal of dredged material was apparently confined to the nearshore coastal waters out to the "Southern Limit of the Dumping Ground", a straight line connecting Barbers Point and Diamond Head and shown on the older, 1975, U.S.G.S. Chart number 19364. In more recent years, the depth of water for disposal has gradually been increased as technology has provided means for accessing deeper water and the disposal sites from previous generations have come within man's reach.

The tradition of disposal of dredged materials in the relatively "nearshore" offshore waters, was likely a factor in the dumping of military ordnance in these areas too. Furthermore, it must be recognized that during World War II, the consideration of possible "environmental" repercussions associated with disposal of military ordnance was not a priority.

Since 1972, the United States Army Corps of Engineers Pacific Ocean Division (POD) has maintained various dredge spoil disposal sites within the general area of Mamala Bay, Oahu, some 3 to 6 miles south of the Honolulu International Airport. New dump sites were proposed in 1975 in the vicinity of the other sites. Research studies of these proposed new sites were undertaken to determine the environmental characteristics of the sites and to evaluate whether the disposal of dredged material would have a significant effect on the physical, chemical, or biological characteristics of the sites. It was during these studies that some 1500 pounds of military ordnance were inadvertently recovered in several of the dredge hauls. Canisters of toxic liquids, believed to be mustard gas, ruptured on retrieval and caused serious injuries to members of the scientific team and ship's crew. The presence of military ordnance suggested that these two sites may qualify as Formerly Used Defense Sites (FUDS) under the Defense Environmental Restoration Program (DERP).

The University of Hawaii Environmental Center was contracted by POD to conduct site investigations using remote scanning equipment and to compile an inventory of information available on the two sites where this ordnance was reported. The investigation includes the preparation of a description of each site's existing environment, interviews with persons knowledgeable about the military munitions disposal activities, research of real estate records as to ownership and their use of the sites, and a discussion of the feasibility of environmental restoration, if required. The primary goal of the project was to determine whether any ordnance or explosive waste materials generated by the Department of Defense require any cleanup action.

1.2 Site Description

Study Site. The study area was located in the offshore waters some 5 miles south of the Honolulu International Airport Reef Runway and Pearl Harbor Naval Base, Oahu, Hawaii (fig. 1). The designated study site, 3A (H09HI0467) was a circle of 1000 yard radius centered at 21° 12.81' N by 157° 55.92' W. (fig. 2). The water depth ranges from 500 meters at the northern limit of Site 3A to 527 meters at the southern limit.

Two dredged material disposal sites are currently located in the vicinity of Site 3A (fig. 2), the South Oahu and Honolulu Harbor sites. In addition, an arch-shaped area closer to the mouth of Pearl Harbor was used for disposal for a brief time in 1977 as part of a study of the environmental effects of dredge spoil disposal (Chave and Miller, 1978). Some 700,000 cubic yards of spoil were disposed in the south eastern corner of that study site.

These sites have been used since 1977 as disposal sites for dredge spoil mainly originating from Pearl Harbor and Honolulu Harbor. According to records provided by the Operations Division of the Army Corps of Engineers, approximately 4 million cubic yards were dumped at the South Oahu site and 4.1 million cubic yards at the Honolulu Harbor site since 1976. Ocean dumping permits were not required until 1976 so records prior to that year are questionable. However, we did find a reference to some 4.2 million cubic yards of dredged material being dumped between 1959-1976 one nautical mile due south of buoy number 1 marking the Pearl Harbor entrance channel (Chave and Miller, 1978). Regardless of the absolute accuracy of the specific locations of disposal, it is apparent that large quantities of dredged materials have been disposed over the past 50 or more years in the waters just offshore of Honolulu and Pearl Harbors. This use of the offshore environment is important in considering remedial actions, if any, for explosive wastes that may be present in this area.

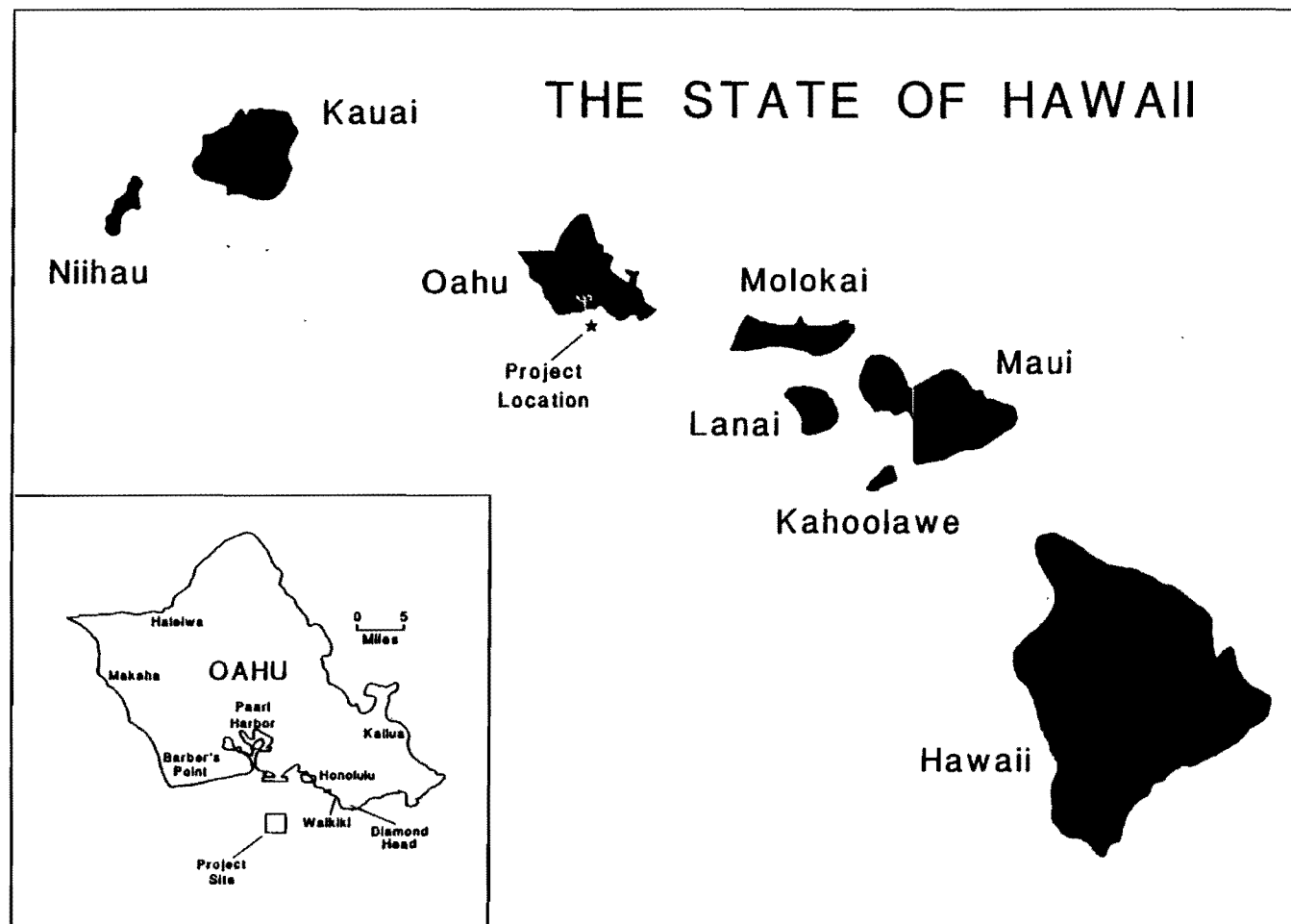


Figure 1. Location of FUDS Study Site 3A (H09HI0467).

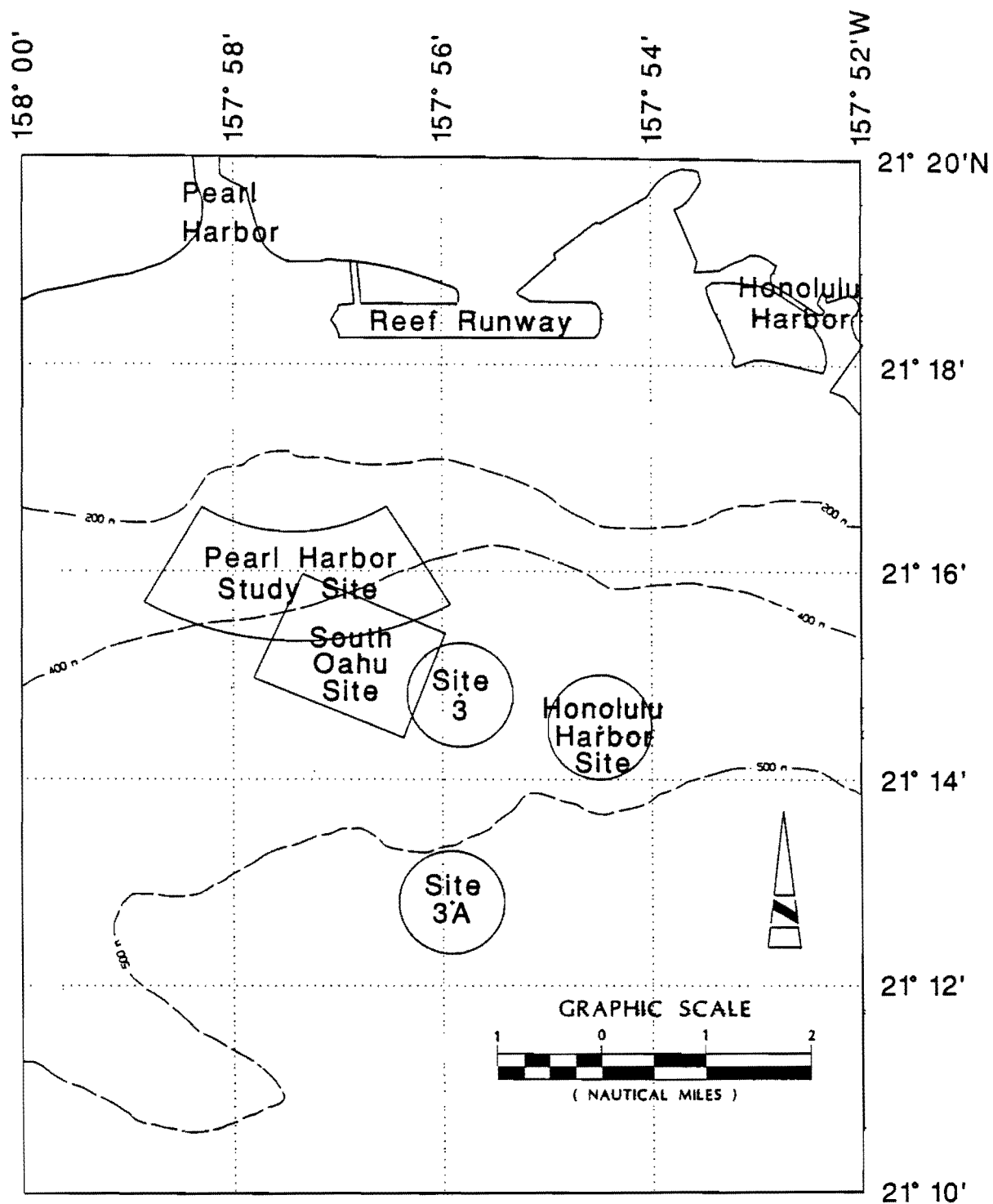


Figure 2. Location of FUDS Study Site 3A (H09HI0467) and its relation to FUDS Site 3 (H09HI0466) and dredge spoil disposal sites in Mamala Bay, Honolulu, Hawaii.

2.0 METHODS

The inventory of the site involved a review of the historical literature, data, records, and files relative to the presence of explosive ordnance in the marine environment as well as a major effort to contact individuals and organizations with pertinent information. Field expeditions were then undertaken using state-of-the-art high resolution side-scan sonar systems and a new, deep water, video camera system to provide the required documentation to confirm the presence and nature of the explosive ordnance in the coastal waters off Honolulu and Pearl Harbors.

2.1 Historical Background

Literature Search. An extensive literature search for background material on the disposal of military ordnance was conducted to locate any references to the disposal of ordnance in Mamala Bay or off the southern coast of Oahu. This search included use of the University of Hawaii, Manoa, computer search facilities, examination of records in the Hawaiiana collection at U.H. Manoa, Hamilton and Sinclair Libraries, the State of Hawaii Public Library on Oahu, and perhaps most importantly the 1929 to 1984 bound indexes and the 1985-1994 computer indexes of the two Honolulu Newspapers, the Honolulu Star Bulletin and the Honolulu Advertiser. Our searches returned numerous articles regarding the discovery of ordnance in coastal waters and specific citations of unexploded ordnance that had been discovered in areas of Makua Beach, Ala Moana Beach Park, Waialua, and Rabbit Island.

Hawaii Undersea Research Laboratory (HURL) Videos. The Hawaii Undersea Research Laboratory of the University of Hawaii maintains and operates two submersibles that have in the past been used near the Mamala Bay disposal sites. The *Makali'i* was used from 1981 through 1986 and made 13 dives as part of a dredge spoil study project. Six dives were made with the *Pisces V* of which one was made in approximately 1000 feet of water north of the study area in 1992.

Voice transcripts and transcribed video logs from all dives in the general vicinity of the study site were reviewed for reference to ordnance. Videos of the dives where ordnance were sighted were viewed and still images were made of all ordnance identified. The sound tracks of the video tapes made by the submersible crew frequently discussed seeing ordnance that was not necessarily filmed by their cameras. Hence, examples of references to ordnance in the voice transcripts are submitted with the still images as additional data.

2.2 Field Work

Research Vessels. The University of Hawaii Marine Center's R/V Kila was the primary vessel for all research cruises during this contract. The R/V Kila is a 105 foot, diesel powered vessel. The size of the ship's crew ranged from 3 to 6 with a 5 to 10 person scientific party. Additional ship time was made available at no charge, aboard the University research ship Moana Wave, courtesy of Dr. Roy Wilkens, during preliminary test runs of his video camera system.

A navigation program titled Maptech was available for the sonar cruises to assist in navigating, since following particular tracklines was essential to the subsequent data analyses and development of computer generated mosaics of the bottom.

The initial field research plan called for complete side-scan sonar surveys of the study site so as to locate suspected ordnance that could then be photographed with the video system on a subsequent cruise. Because the sonar system provides a much broader beam width for each transect than is possible with the video camera, we expected to maximize the efficiency of the available ship time by using the sonar images to locate potential ordnance and use the video for confirmation and documentation.

Side Scan Sonar. Site 3A was of sufficient size and depth that remote methods were required to inventory the site for possible ordnance. Topographical images of the ocean floor were acquired using an EG&G DF-1000 Digital Side Scan Sonar System. The system consisted of a DF-1000 digital towfish, Kevlar reinforced co-axial cable, depressor weight, digital control unit, and Sun computer data logging system. The system was provided and operated by Dr. Charles Morgan of the University of Hawaii's Marine Minerals Research Center.

The towfish and depressor weight were deployed and cable payed out until the towfish reached an altitude of approximately 40 meters above the bottom. The altitude was continuously monitored and adjusted to maintain proper position above the bottom. The towfish emits a sonar beam of 50° vertical width from each side of the unit. The area of coverage increases with altitude, but resolution decreases, hence every effort was made to keep the towfish as close to the bottom (i.e., 40 m) as safety for the equipment would permit. The frequency of the beam is user-selectable as either 100 kHz or 400 kHz. The time and strength of the return signal signifies the distance from the unit and characteristics of the reflector: strong signals are emitted from rock or metal, weak signals correspond to poor reflectors, such as sand. Most of our sampling was done at the 400 kHz frequency to maximize the possibility of imaging small scale (ordnance sized) materials.

The towfish unit digitizes the data and sends it to the computer system, where it is displayed in real-time, waterfall format and continuously saved to the tape drive. The data from various passes through the study areas were subsequently processed and combined into mosaic form to show the features of the entire area.

Fiber Optic Communication Undersea System (FOCUS). To inventory the individual pieces of ordnance in the study site it was necessary to obtain visual images of sufficient clarity and resolution to permit explosives ordnance specialists to accurately identify the types of ordnance discovered. To this end we used a new "Fiber Optic Communication Undersea System", FOCUS. FOCUS is a real-time deep-sea video system designed by Dr. Roy Wilkens and Mr. Patrick Jonke of the Hawaii Institute of Geophysics of the University of Hawaii, Manoa. The system takes advantage of the unique characteristics of fiber optic telemetry that permits the use of a relatively small, lightweight cable and wide bandwidth attributable to fiber optics. This allows the system to be used at great depths without compromising the quality of the return signal. The system has been funded by the National Science Foundation and the University since 1989.

Power is provided by the support vessel and passed through the copper conductor portion of the fiber optic cable to the camera vehicle. The video signal from the camera is transported up the cable to a Video Cassette Recorder (VCR) that records the real-time image. Two 500 Watt incandescent lights illuminate the field of view.

The system is capable of viewing the sea floor from an altitude of approximately 10 m, but in practice, the camera vehicle is typically flown at an altitude of 1 to 5 m. The system is rugged enough to survive occasional collisions with the bottom without sustaining damage, but bottom entanglement is always a risk. Early in the camera inventory work a series of unfortunate actions occurred that included an apparent electronic problem that led to reduced picture quality which in turn led to bottom impact, cable failure, and the loss of the camera.

A replacement system was constructed and used for the final photographic work for the inventory. The new system includes a forward looking camera and two additional lights.

3.0 RESULTS/FINDINGS

3.1 Historical Background

Literature Search. An intensive effort was undertaken to locate old records, journals, reports, and newspaper articles relating to ordnance disposal in the marine environment off of Honolulu and Pearl Harbors. A complete listing of the libraries, documents, and subject titles searched as well as a summary of the findings of this effort is presented in the DERP-FUDS Inventory Project Report: Sources of Information. With the exception of newspaper articles, very little definitive information was obtained from most of these sources. Newspaper articles were somewhat more specific and provided numerous accounts of incidents of ordnance discovery in nearshore waters. Specific information on the ocean disposal of ordnance or use of the site by the military was unavailable.

Interviews. Interviews were held with various individuals and military commands in an attempt to uncover historical evidence of ordnance disposal in Mamala Bay. Individuals or specific military commands to interview were selected on the basis of referrals from a superior command to the applicable subordinate command, or by personal knowledge of individuals and the Hawaii naval force structure by the research team.

Historical research proved to be frustrated by a lack of data, probably caused by the long time span (~ 50 years) involved. It was found that newspapers provided useful accounts of ordnance discoveries by the public, or of major incidents, but little record of ordnance inventories seemed to be available. The nature of "disposal" may have contributed to the paucity of information since objects "disposed" may not have been deemed worthy of record keeping. A listing of the references examined and interviews completed is provided in the DERP-FUDS Inventory Project Report: Sources of Information.

3.2 Field Work

Side Scan Sonar. Side scan sonar cruises were made aboard the University of Hawaii's R/V Kila on November 16, 1994, and January 24, 1995. Cruise tracks are shown in Figure 3. The data were analyzed by the Marine Minerals Technology Center and output into a mosaic format showing the entire study area (Appendix A of the DERP Report). The mosaic suggests that the northern portion of Site 3A is characterized by large, irregular reflectors, but the resolution of the side scan sonar instrument was insufficient to characterize the bottom sediments or to identify any small scale reflectors as would be expected for ordnance.

Fiber Optic Communication Undersea System (FOCUS). FOCUS cruises aboard the University of Hawaii's R/V Moana Wave and R/V Kila have provided some 12.75 miles of video coverage in the general vicinity of the study site (fig. 4). Unfortunately, due to a series of equipment failures, and/or rough seas and strong current conditions, the intended systematic transect cruises with the FOCUS system through the central portions of the study site were only marginally successful. Each set of cruises began with general testing of the system in shallow water to assure proper instrument functions and to ascertain current drift. Subsequent deployment was in the vicinity of the specific study site, however, off-course drift frequently became a significant problem due to wind, sea, and current conditions in Mamala Bay.

On the more positive side, a total of 22 definite ordnance items in the immediate vicinity of the designated study site were identified by Donaldson Enterprises, Inc. (Table 1 and fig. 5; Appendix B of the DERP Report). It was apparent that considerable material is present north of Site 3A. The side-scan sonar data showed many strong returns in that area and the region was surveyed with the video camera in an attempt to provide "ground truth" for the side-scan sonar data. However, the only "objects" found in the video footage were precipitous coral blocks or basaltic flows with vertical relief of at least 30 meters in some cases. There was no indication of man made objects providing the hard return signals recorded by the side-scan system and all objects that could have produced the returns recorded appeared to be only natural features of irregular, bottom relief.

Hawaii Undersea Research Laboratory (HURL) Videos and Transcripts. Dive logs, voice transcripts, and video logs from 13 *Makali'i* dives and 6 *Pisces V* dives were examined. Two of the dives (*Makali'i* 82-87 and *Pisces V* P5-200) provided 9 hours of video including many ordnance observations. Still images from the video and voice transcripts are included in Appendix B of the DERP Report. Donaldson Enterprises, Inc., provided identification of the ordnance.

Donaldson Enterprises Incorporated Descriptions. A list and video images of the 22 individual ordnance items identified in either the videos taken with the FOCUS system or on the HURL dives are shown in Table 1; and in Appendix B (Plates 1-22) of the DERP Report.

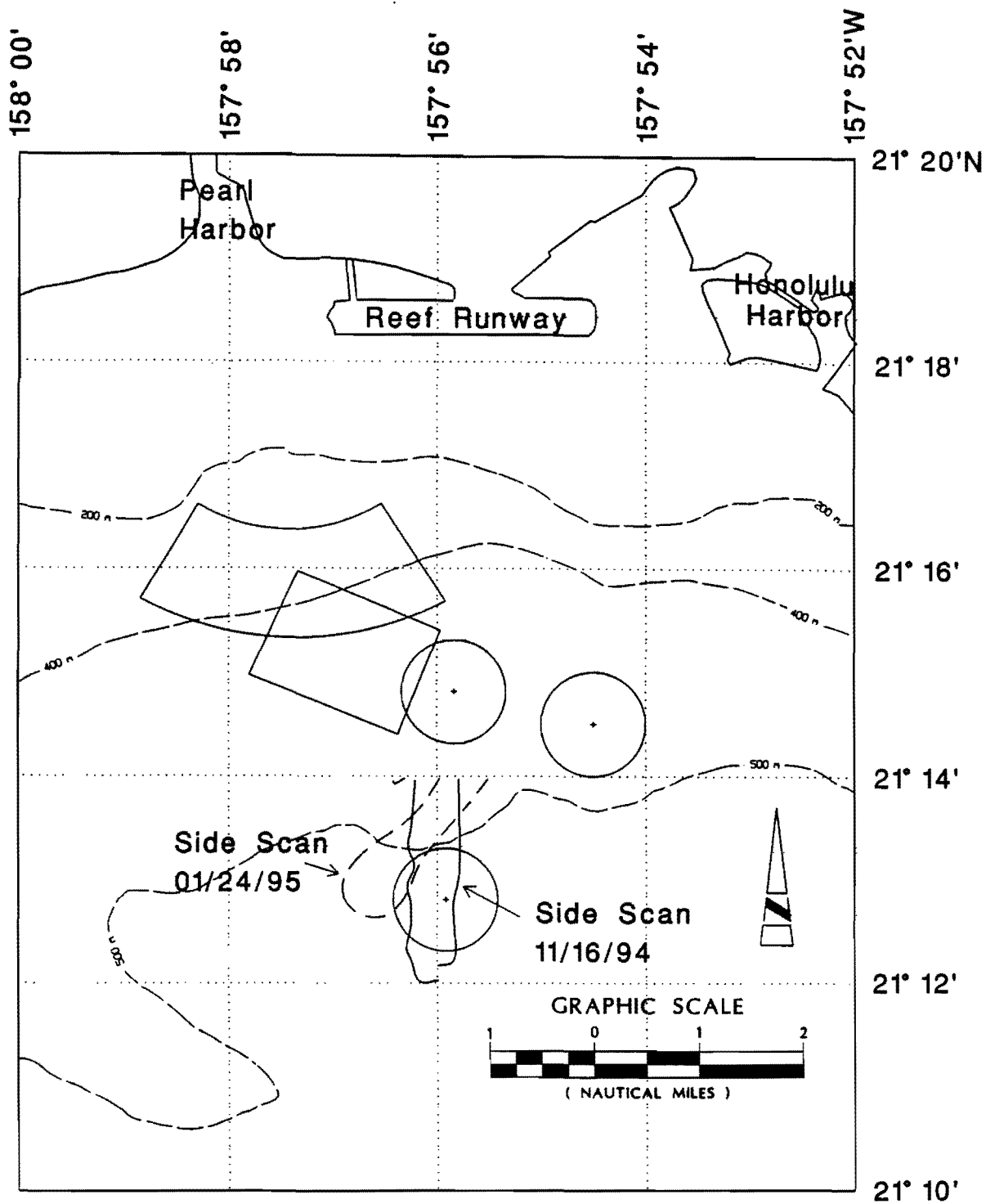


Figure 3. Side scan sonar cruise locations.

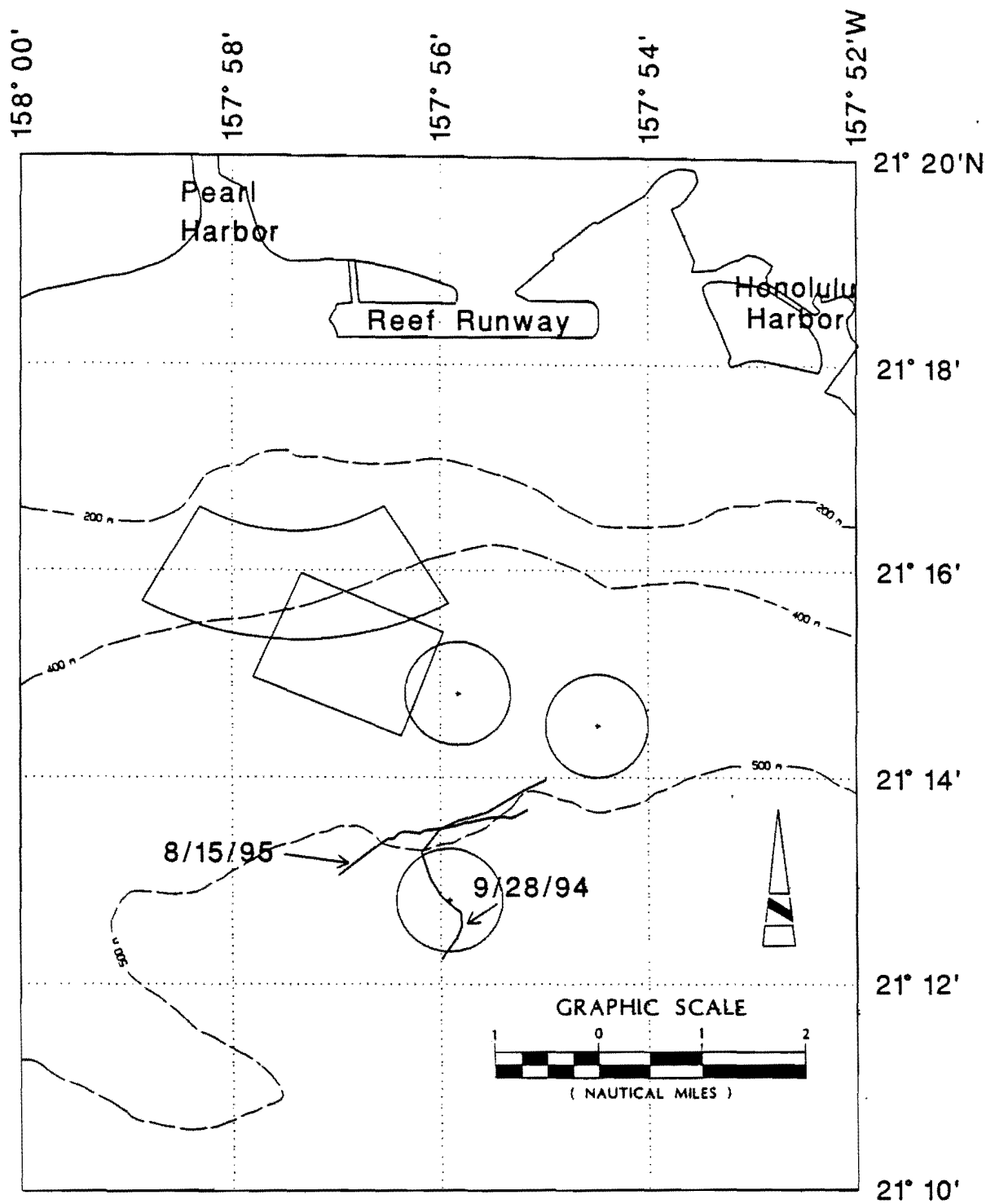


Figure 4. Location of video transects made on September 28, 1994 and August 15, 1995.

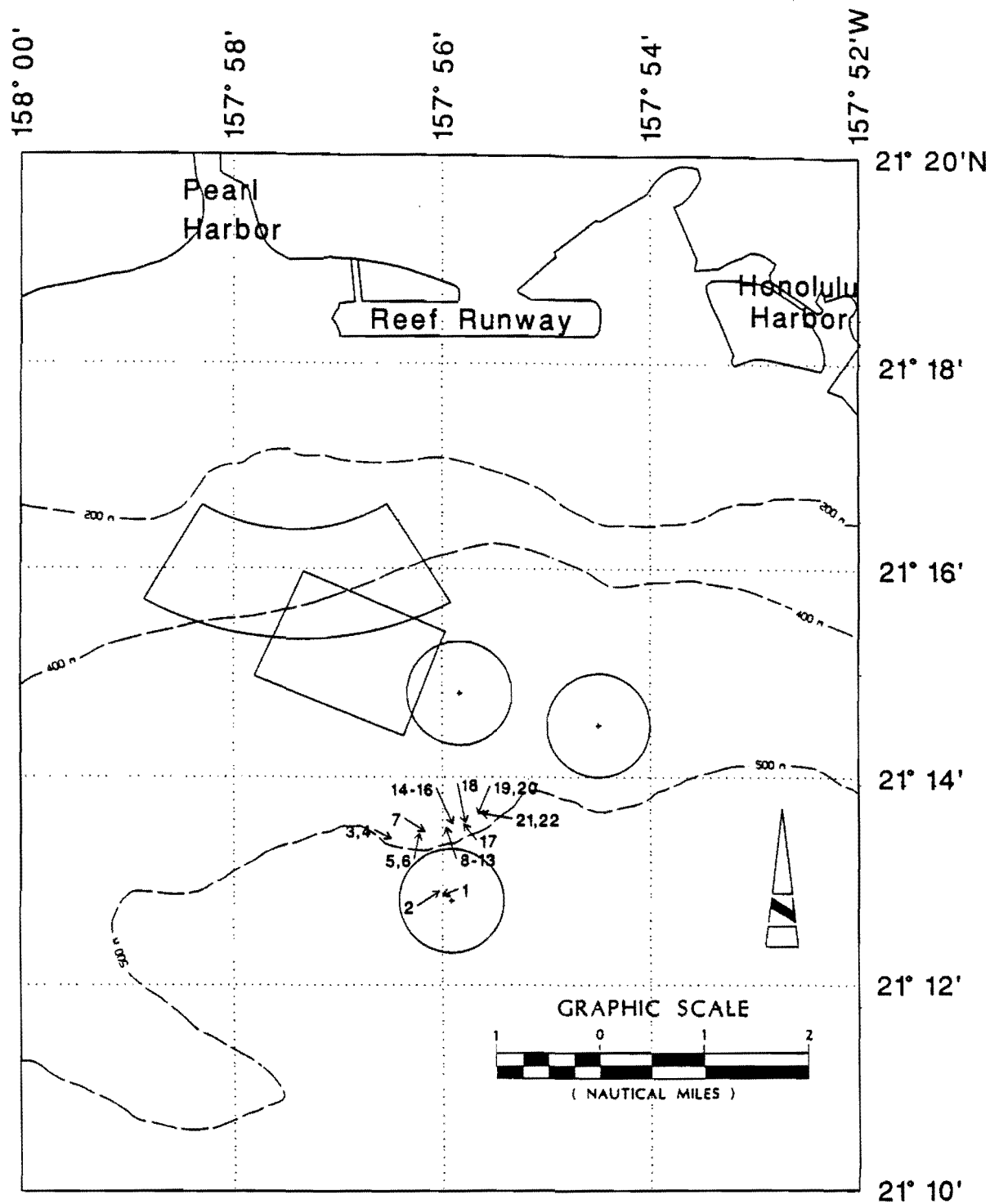


Figure 5. Location of ordnance and explosive wastes as recorded on videotape. Numbers correspond to ordnance identifications listed in Table 1 as provided by Donaldson Enterprises, Explosive Ordnance Disposal Specialists.

FUDS/FOCUS Video/Ordnance Locations				
Site 3A				
Item No.	Description	Longitude (157 deg)	Latitude (21 deg)	Survey
1	Naval Projectile, 8" to 16", High-Capacity Round.	56.00	12.86	9/28/94
2	Large Cylinder, Possibly A/C Rocket Motor or Container.	56.03	12.90	9/28/94
3	Projectile.	56.46	13.40	8/15/95
4	Aircraft Rocket Launcher.	56.49	13.41	8/15/95
5	Projectile.	56.22	13.46	8/15/95
6	Barrage Rocket.	56.22	13.46	8/15/95
8	7.2" Barrage Rocket, a.k.a. "Mousetrap."	55.99	13.50	9/28/94
8	Linked Ammunition.	56.17	13.48	8/17/95
9	Naval Projectile, 8" to 16".	55.98	13.51	9/28/94
10	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.98	13.51	9/28/94
11	M 26 Flare Bomb, expended.	55.97	13.52	9/28/94
12	M 26 Flare Bomb, expended.	55.96	13.52	9/28/94
13	M 26 Flare Bomb, expended.	55.95	13.53	9/28/94
14	Large Cylinder, Possibly A/C Rocket Motor or Container.	55.90	13.55	9/28/94
15	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.89	13.56	9/28/94
16	Ammo Box With Growth or Spillage.	55.88	13.57	9/28/94
17	Rocket Motor.	55.80	13.55	8/15/95
18	Rocket Launcher—Multiple Tubes.	55.78	13.56	8/15/95
19	Rocket Motor.	55.66	13.64	9/28/94
20	Rocket Motor.	55.66	13.64	9/28/94
21	Munitions Pod With Fins.	55.65	13.64	9/28/94
22	Munitions Pod With Fins, No ID.	55.63	13.65	9/28/94

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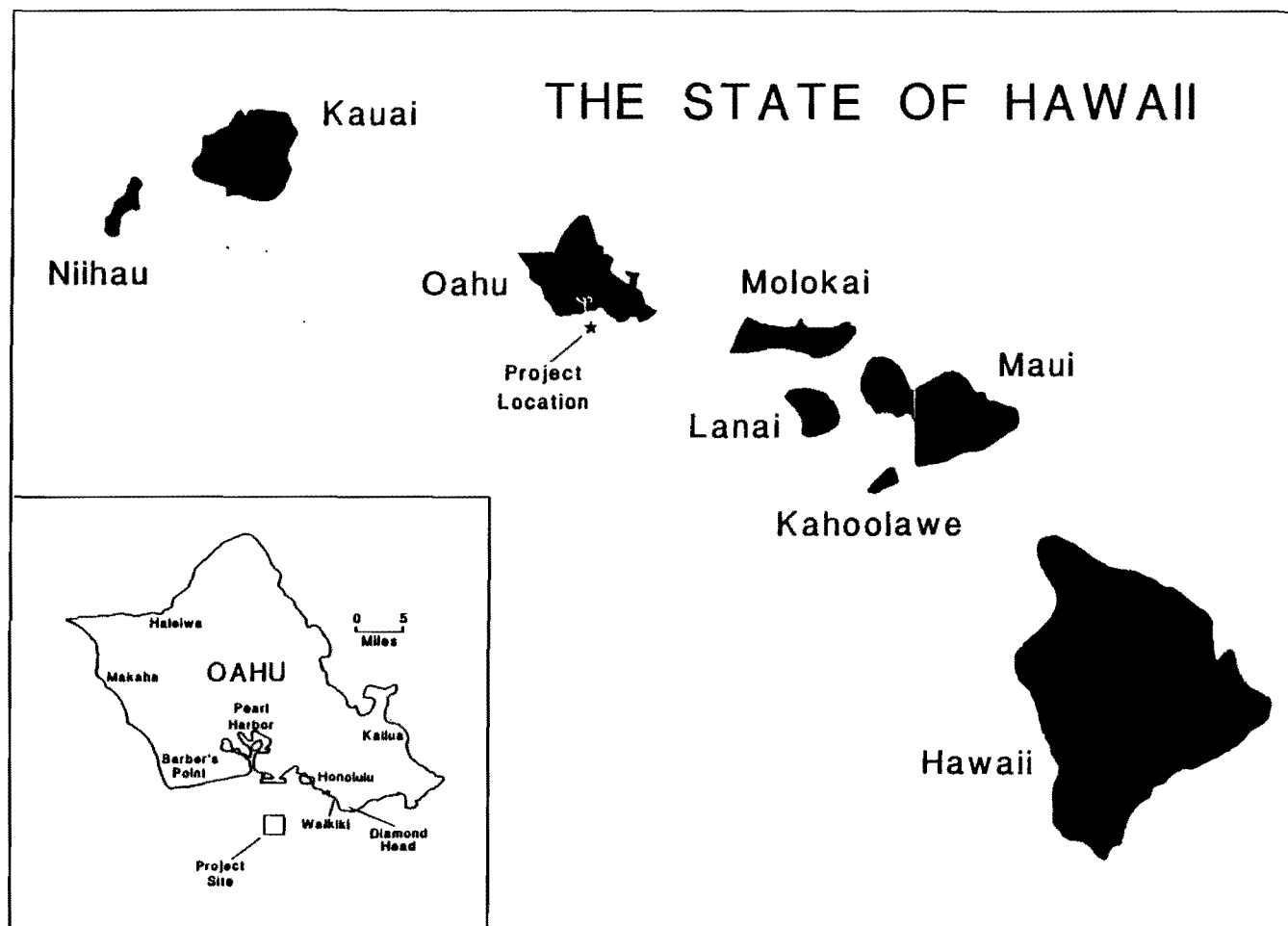


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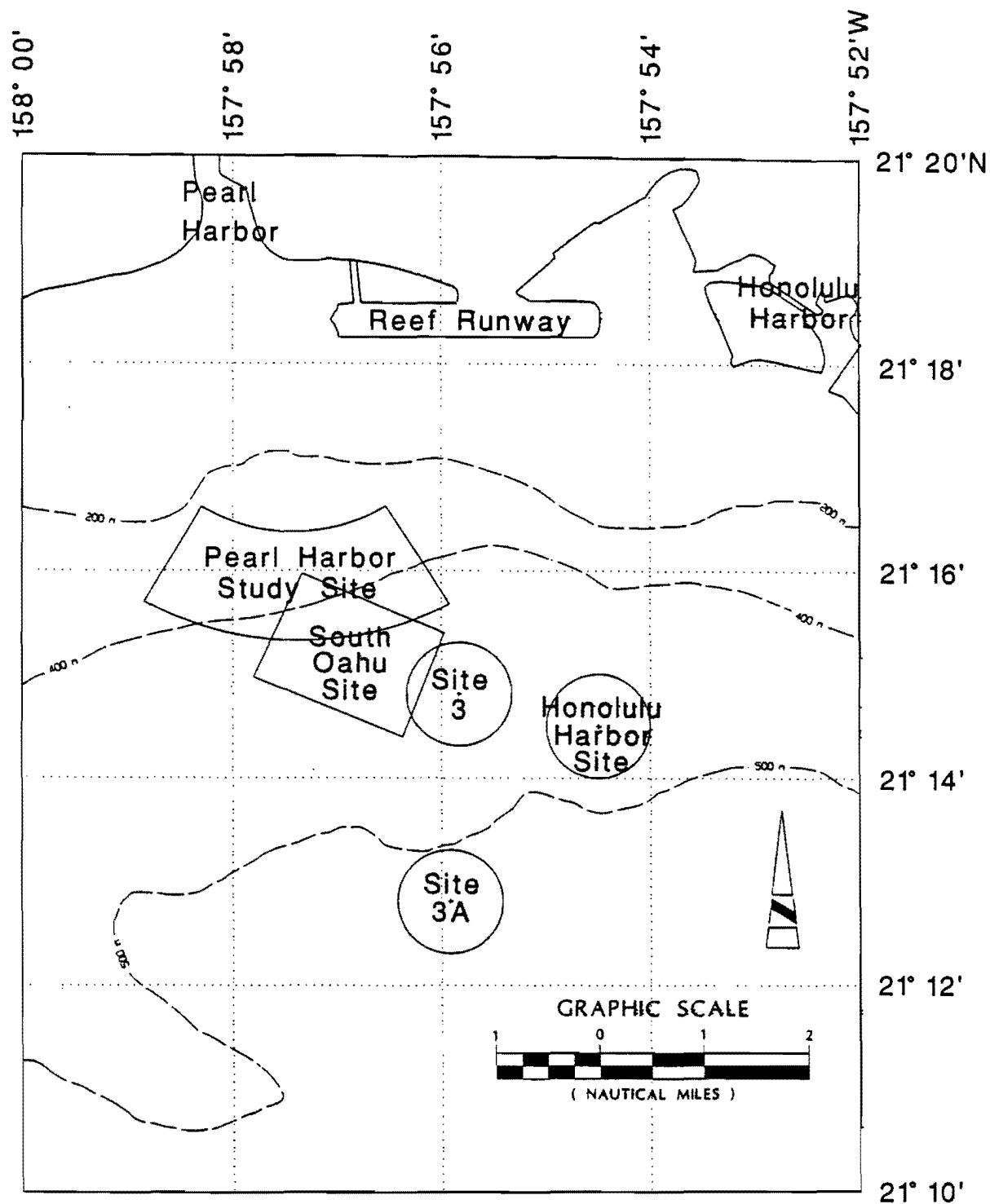


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Literature Search. An extensive literature search for background material on the disposal of military ordnance was conducted to locate any references to the disposal of ordnance in Mamala Bay or off the southern coast of Oahu. This search included use of the University of Hawaii, Manoa, computer search facilities, examination of records in the Hawaiiana collection at U.H. Manoa, Hamilton and Sinclair Libraries, the State of Hawaii Public Library on Oahu, and perhaps most importantly the 1929 to 1984 bound indexes and the 1985-1994 computer indexes of the two Honolulu Newspapers, the Honolulu Star Bulletin and the Honolulu Advertiser. Our searches returned numerous articles regarding the discovery of ordnance in coastal waters and specific citations of unexploded ordnance that had been discovered in areas of Makua Beach, Ala Moana Beach Park, Waialua, and Rabbit Island.

Hawaii Undersea Research Laboratory (HURL) Videos. The Hawaii Undersea Research Laboratory of the University of Hawaii maintains and operates two submersibles that have in the past been used near the Mamala Bay disposal sites. The *Makali'i* was used from 1981 through 1986 and made 13 dives as part of a dredge spoil study project. Six dives were made with the *Pisces V* of which one was made in approximately 1000 feet of water north of the study area in 1992.

Voice transcripts and transcribed video logs from all dives in the general vicinity of the study site were reviewed for reference to ordnance. Videos of the dives where ordnance were sighted were viewed and still images were made of all ordnance identified. The sound tracks of the video tapes made by the submersible crew frequently discussed seeing ordnance that was not necessarily filmed by their cameras. Hence, examples of references to ordnance in the voice transcripts are submitted with the still images as additional data.

2.2 Field Work

Research Vessels. The University of Hawaii Marine Center's R/V Kila was the primary vessel for all research cruises during this contract. The R/V Kila is a 105 foot, diesel powered vessel. The size of the ship's crew ranged from 3 to 6 with a 5 to 10 person scientific party. Additional ship time was made available at no charge, aboard the University research ship Moana Wave, courtesy of Dr. Roy Wilkens, during preliminary test runs of his video camera system.

A navigation program titled Maptech was available for the sonar cruises to assist in navigating, since following particular tracklines was essential to the subsequent data analyses and development of computer generated mosaics of the bottom.

The initial field research plan called for complete side-scan sonar surveys of the study site so as to locate suspected ordnance that could then be photographed with the video system on a subsequent cruise. Because the sonar system provides a much broader beam width for each transect than is possible with the video camera, we expected to maximize the efficiency of the available ship time by using the sonar images to locate potential ordnance and use the video for confirmation and documentation.

Side Scan Sonar. Site 3A was of sufficient size and depth that remote methods were required to inventory the site for possible ordnance. Topographical images of the ocean floor were acquired using an EG&G DF-1000 Digital Side Scan Sonar System. The system consisted of a DF-1000 digital towfish, Kevlar reinforced co-axial cable, depressor weight, digital control unit, and Sun computer data logging system. The system was provided and operated by Dr. Charles Morgan of the University of Hawaii's Marine Minerals Research Center.

The towfish and depressor weight were deployed and cable payed out until the towfish reached an altitude of approximately 40 meters above the bottom. The altitude was continuously monitored and adjusted to maintain proper position above the bottom. The towfish emits a sonar beam of 50° vertical width from each side of the unit. The area of coverage increases with altitude, but resolution decreases, hence every effort was made to keep the towfish as close to the bottom (i.e., 40 m) as safety for the equipment would permit. The frequency of the beam is user-selectable as either 100 kHz or 400 kHz. The time and strength of the return signal signifies the distance from the unit and characteristics of the reflector: strong signals are emitted from rock or metal, weak signals correspond to poor reflectors, such as sand. Most of our sampling was done at the 400 kHz frequency to maximize the possibility of imaging small scale (ordnance sized) materials.

The towfish unit digitizes the data and sends it to the computer system, where it is displayed in real-time, waterfall format and continuously saved to the tape drive. The data from various passes through the study areas were subsequently processed and combined into mosaic form to show the features of the entire area.

Fiber Optic Communication Undersea System (FOCUS). To inventory the individual pieces of ordnance in the study site it was necessary to obtain visual images of sufficient clarity and resolution to permit explosives ordnance specialists to accurately identify the types of ordnance discovered. To this end we used a new "Fiber Optic Communication Undersea System", FOCUS. FOCUS is a real-time deep-sea video system designed by Dr. Roy Wilkens and Mr. Patrick Jonke of the Hawaii Institute of Geophysics of the University of Hawaii, Manoa. The system takes advantage of the unique characteristics of fiber optic telemetry that permits the use of a relatively small, lightweight cable and wide bandwidth attributable to fiber optics. This allows the system to be used at great depths without compromising the quality of the return signal. The system has been funded by the National Science Foundation and the University since 1989.

Power is provided by the support vessel and passed through the copper conductor portion of the fiber optic cable to the camera vehicle. The video signal from the camera is transported up the cable to a Video Cassette Recorder (VCR) that records the real-time image. Two 500 Watt incandescent lights illuminate the field of view.

The system is capable of viewing the sea floor from an altitude of approximately 10 m, but in practice, the camera vehicle is typically flown at an altitude of 1 to 5 m. The system is rugged enough to survive occasional collisions with the bottom without sustaining damage, but bottom entanglement is always a risk. Early in the camera inventory work a series of unfortunate actions occurred that included an apparent electronic problem that led to reduced picture quality which in turn led to bottom impact, cable failure, and the loss of the camera.

A replacement system was constructed and used for the final photographic work for the inventory. The new system includes a forward looking camera and two additional lights.

3.0 RESULTS/FINDINGS

3.1 Historical Background

Literature Search. An intensive effort was undertaken to locate old records, journals, reports, and newspaper articles relating to ordnance disposal in the marine environment off of Honolulu and Pearl Harbors. A complete listing of the libraries, documents, and subject titles searched as well as a summary of the findings of this effort is presented in the DERP-FUDS Inventory Project Report: Sources of Information. With the exception of newspaper articles, very little definitive information was obtained from most of these sources. Newspaper articles were somewhat more specific and provided numerous accounts of incidents of ordnance discovery in nearshore waters. Specific information on the ocean disposal of ordnance or use of the site by the military was unavailable.

Interviews. Interviews were held with various individuals and military commands in an attempt to uncover historical evidence of ordnance disposal in Mamala Bay. Individuals or specific military commands to interview were selected on the basis of referrals from a superior command to the applicable subordinate command, or by personal knowledge of individuals and the Hawaii naval force structure by the research team.

Historical research proved to be frustrated by a lack of data, probably caused by the long time span (~ 50 years) involved. It was found that newspapers provided useful accounts of ordnance discoveries by the public, or of major incidents, but little record of ordnance inventories seemed to be available. The nature of "disposal" may have contributed to the paucity of information since objects "disposed" may not have been deemed worthy of record keeping. A listing of the references examined and interviews completed is provided in the DERP-FUDS Inventory Project Report: Sources of Information.

3.2 Field Work

Side Scan Sonar. Side scan sonar cruises were made aboard the University of Hawaii's R/V Kila on November 16, 1994, and January 24, 1995. Cruise tracks are shown in Figure 3. The data were analyzed by the Marine Minerals Technology Center and output into a mosaic format showing the entire study area (Appendix A of the DERP Report). The mosaic suggests that the northern portion of Site 3A is characterized by large, irregular reflectors, but the resolution of the side scan sonar instrument was insufficient to characterize the bottom sediments or to identify any small scale reflectors as would be expected for ordnance.

Fiber Optic Communication Undersea System (FOCUS). FOCUS cruises aboard the University of Hawaii's R/V Moana Wave and R/V Kila have provided some 12.75 miles of video coverage in the general vicinity of the study site (fig. 4). Unfortunately, due to a series of equipment failures, and/or rough seas and strong current conditions, the intended systematic transect cruises with the FOCUS system through the central portions of the study site were only marginally successful. Each set of cruises began with general testing of the system in shallow water to assure proper instrument functions and to ascertain current drift. Subsequent deployment was in the vicinity of the specific study site, however, off-course drift frequently became a significant problem due to wind, sea, and current conditions in Mamala Bay.

On the more positive side, a total of 22 definite ordnance items in the immediate vicinity of the designated study site were identified by Donaldson Enterprises, Inc. (Table 1 and fig. 5; Appendix B of the DERP Report). It was apparent that considerable material is present north of Site 3A. The side-scan sonar data showed many strong returns in that area and the region was surveyed with the video camera in an attempt to provide "ground truth" for the side-scan sonar data. However, the only "objects" found in the video footage were precipitous coral blocks or basaltic flows with vertical relief of at least 30 meters in some cases. There was no indication of man made objects providing the hard return signals recorded by the side-scan system and all objects that could have produced the returns recorded appeared to be only natural features of irregular, bottom relief.

Hawaii Undersea Research Laboratory (HURL) Videos and Transcripts. Dive logs, voice transcripts, and video logs from 13 *Makali'i* dives and 6 *Pisces V* dives were examined. Two of the dives (*Makali'i* 82-87 and *Pisces V* P5-200) provided 9 hours of video including many ordnance observations. Still images from the video and voice transcripts are included in Appendix B of the DERP Report. Donaldson Enterprises, Inc., provided identification of the ordnance.

Donaldson Enterprises Incorporated Descriptions. A list and video images of the 22 individual ordnance items identified in either the videos taken with the FOCUS system or on the HURL dives are shown in Table 1; and in Appendix B (Plates 1-22) of the DERP Report.

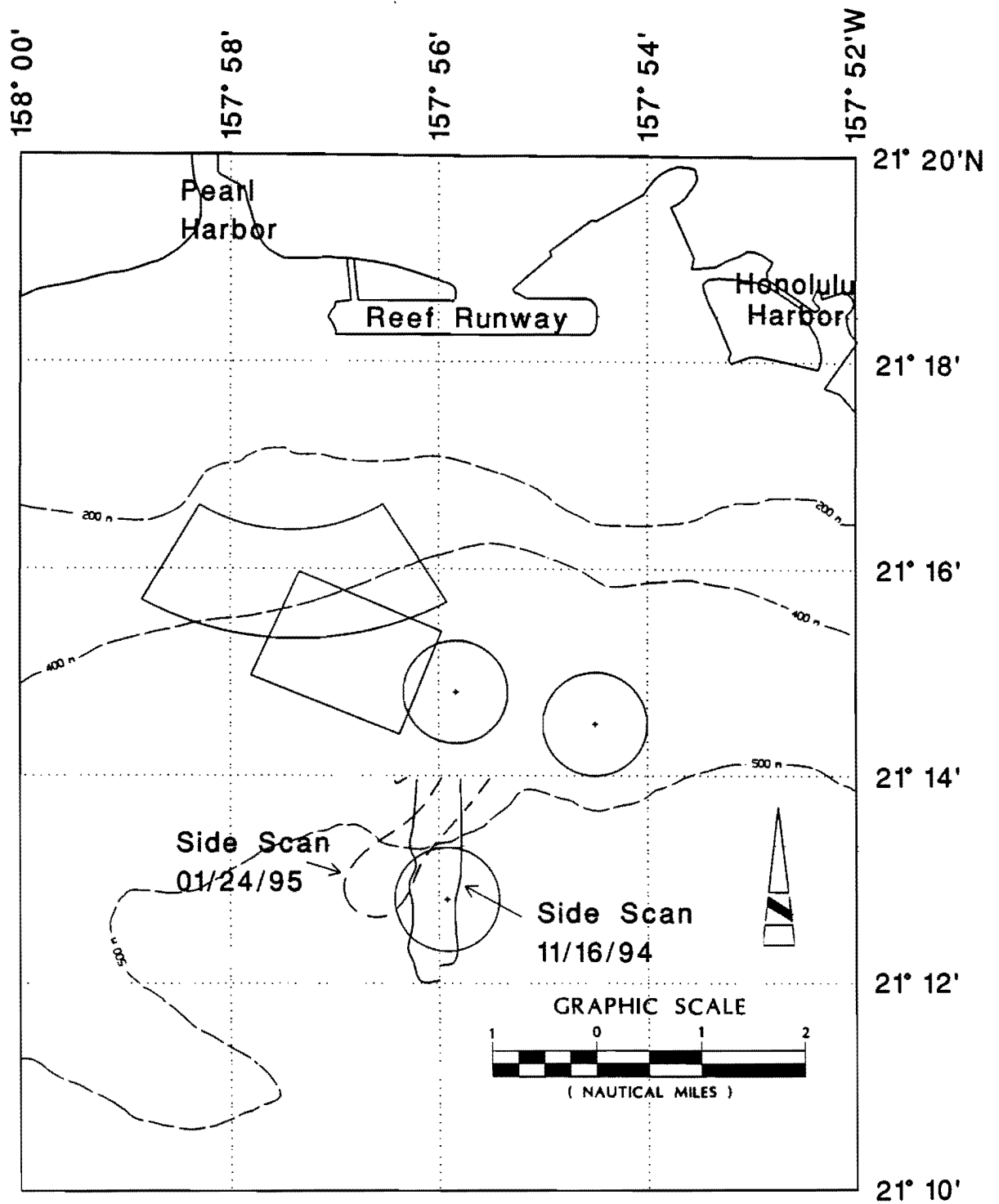


Figure 3. Side scan sonar cruise locations.

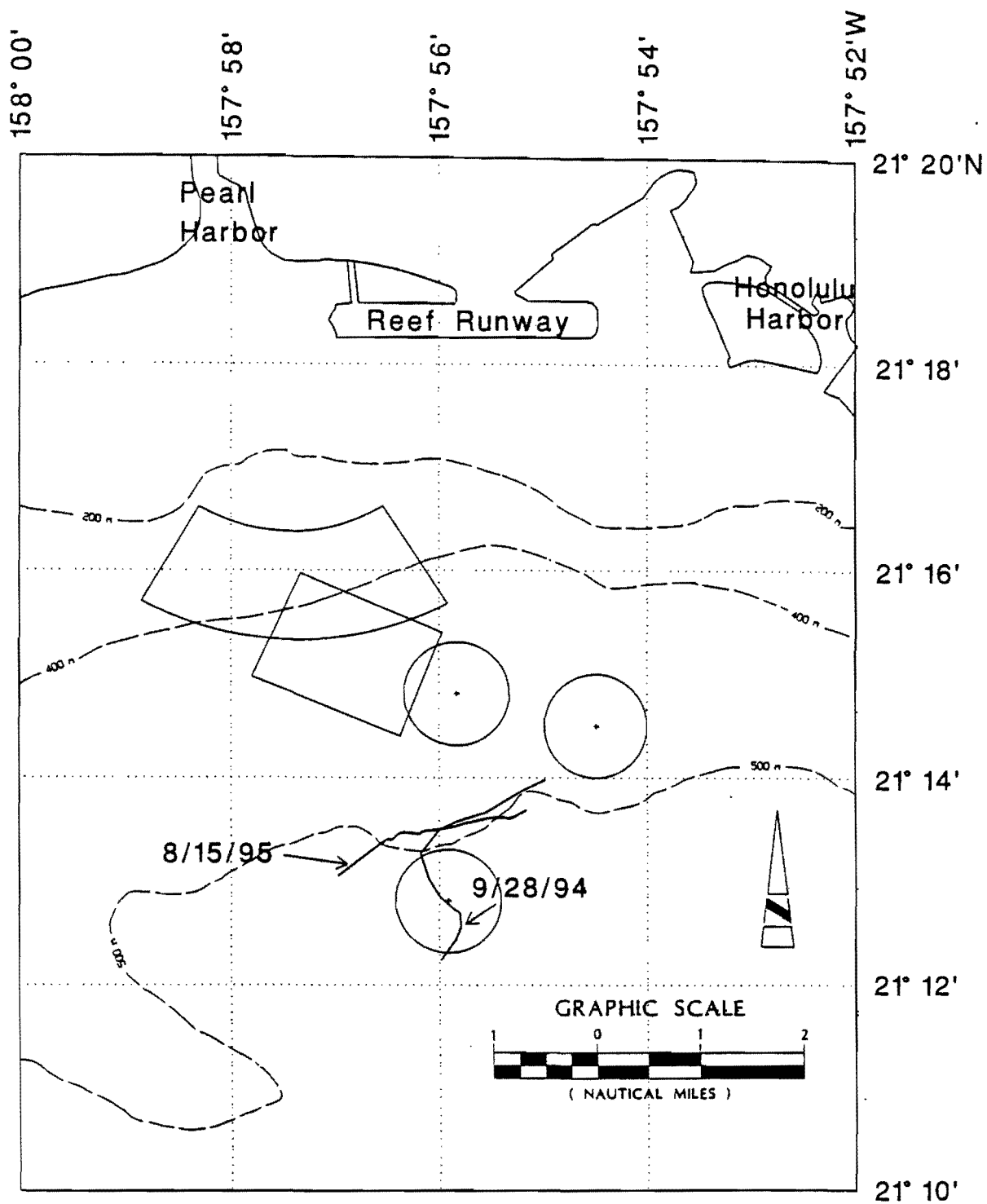


Figure 4. Location of video transects made on September 28, 1994 and August 15, 1995.

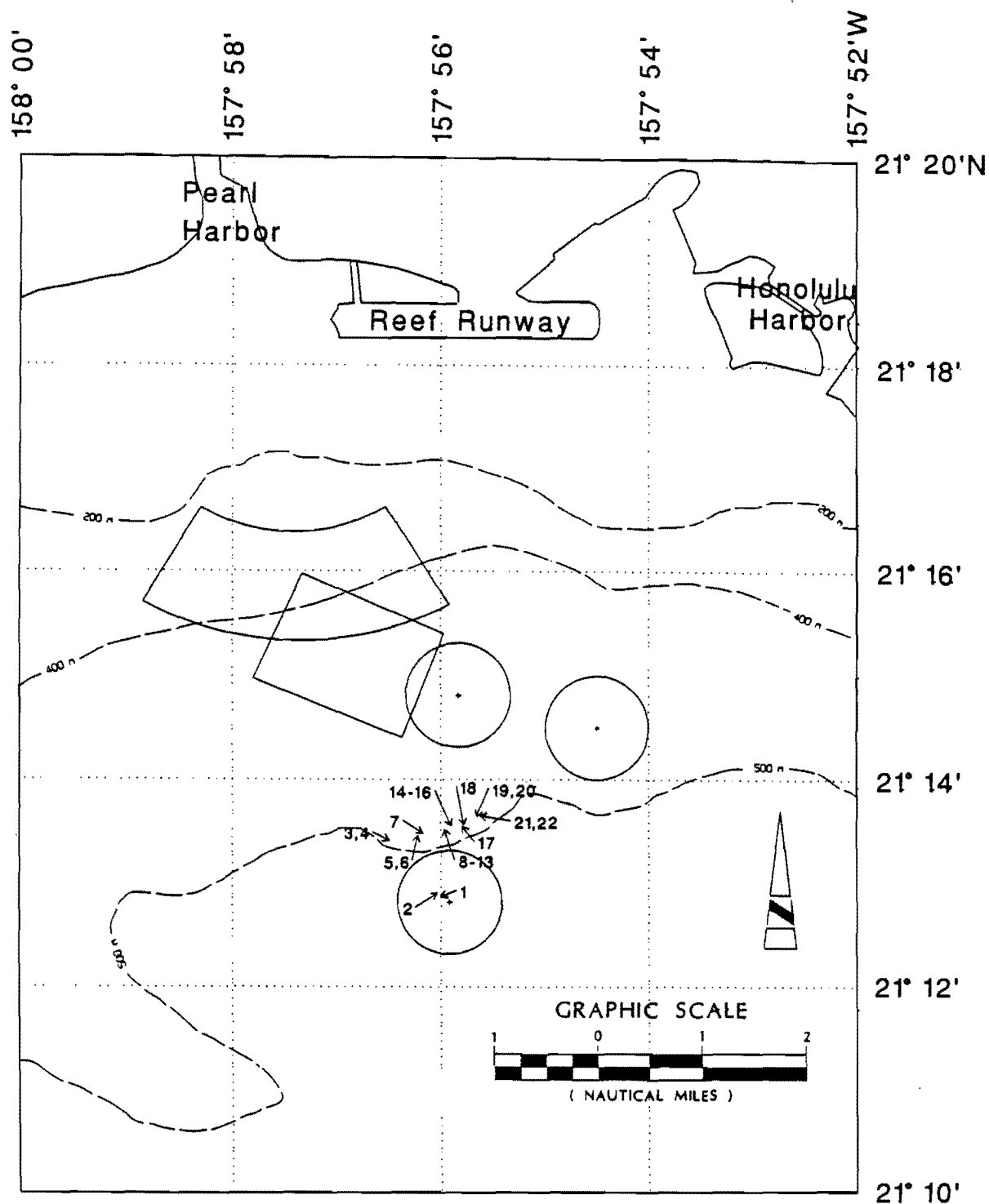


Figure 5. Location of ordnance and explosive wastes as recorded on videotape. Numbers correspond to ordnance identifications listed in Table 1 as provided by Donaldson Enterprises, Explosive Ordnance Disposal Specialists.

FUDS/FOCUS Video/Ordnance Locations				
Site 3A				
Item No.	Description	Longitude (157 deg)	Latitude (21 deg)	Survey
1	Naval Projectile, 8" to 16", High-Capacity Round.	56.00	12.86	9/28/94
2	Large Cylinder, Possibly A/C Rocket Motor or Container.	56.03	12.90	9/28/94
3	Projectile.	56.46	13.40	8/15/95
4	Aircraft Rocket Launcher.	56.49	13.41	8/15/95
5	Projectile.	56.22	13.46	8/15/95
6	Barrage Rocket.	56.22	13.46	8/15/95
8	7.2" Barrage Rocket, a.k.a. "Mousetrap."	55.99	13.50	9/28/94
8	Linked Ammunition.	56.17	13.48	8/17/95
9	Naval Projectile, 8" to 16".	55.98	13.51	9/28/94
10	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.98	13.51	9/28/94
11	M 26 Flare Bomb, expended.	55.97	13.52	9/28/94
12	M 26 Flare Bomb, expended.	55.96	13.52	9/28/94
13	M 26 Flare Bomb, expended.	55.95	13.53	9/28/94
14	Large Cylinder, Possibly A/C Rocket Motor or Container.	55.90	13.55	9/28/94
15	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.89	13.56	9/28/94
16	Ammo Box With Growth or Spillage.	55.88	13.57	9/28/94
17	Rocket Motor.	55.80	13.55	8/15/95
18	Rocket Launcher--Multiple Tubes.	55.78	13.56	8/15/95
19	Rocket Motor.	55.66	13.64	9/28/94
20	Rocket Motor.	55.66	13.64	9/28/94
21	Munitions Pod With Fins.	55.65	13.64	9/28/94
22	Munitions Pod With Fins, No ID.	55.63	13.65	9/28/94

Table 1. Location and description of ordnance video taped during FOCUS transects and HURL surveys. Ordnance identified by Donaldson Enterprises.

4.0 RECOMMENDATIONS

The original intent of the work plan was to identify possible ordnance using high resolution side-scan sonar with subsequent video mapping to provide ground truth. The side-scan sonar data proved to be fruitless. Resolution, even after extensive efforts at computer image processing and enhancement, was insufficient to detect ordnance sized objects. On the more positive side, the video camera work, despite many small but operationally important delays and problems, provided excellent visual documentation of explosive wastes on the sea floor over a much wider area than had previously been suspected.

Given the knowledge that explosive wastes do occur in this deep water area, we must consider what further action, if any, should be taken. In our early discussions, we had initially thought that if explosive wastes were found in the study site, one remediation action that could be considered was burial with dredge spoil. Since the existing dredge spoil disposal sites are very close, we had thought that a modest relocation of the Honolulu and South Oahu disposal sites might be feasible. However, the video images clearly show that a substantial number of explosive materials are remaining at the surface, even in areas where millions of cubic yards of dredged spoil have been dumped in the past. Hence, we have concluded that bottom currents or even biological perturbation of the sediments are sufficient to keep at least a fair percentage of the bulky materials, rocks, munitions, bombs, etc. swept clean, perhaps in the same manner that manganese nodules are found lying on top of finer deposits on the sea floor.

Because we are unsure of the areal extent of the explosive ordnance as of this time, we are unable to make a definite recommendation as to remedial action. We recommend that additional systematic video transects be undertaken, with emphasis on the areas between 50 and 350 meters directly south of Pearl and Honolulu Harbors, to verify and map the extent of the ordnance. Following this mapping, we suggest that alternative remediation measures be examined, including the no-action alternative, to arrive at an environmentally as well as economically supportable restoration or management recommendation.

DERP - FUDS
Inventory Project Report

Offshore Waters, Honolulu, Hawaii
Island of Oahu, Hawaii
Site 3A No. H09HI0467
February 28, 1996

Prepared by
University of Hawaii
Environmental Center

For
U.S. Army Engineer District
Pacific Ocean Division
Fort Shafter, Hawaii

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for DERP-FUDS Inventory Project Report

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TABLE:

- Table 1** **Location and description of ordnance video taped during FOCUS transects and HURL surveys. Ordnance identified by Donaldson Enterprises.**

SITE SURVEY SUMMARY SHEET
FOR
DERP - FUDS SITE 3 NO. H09HI0466 and SITE 3A NO. H09HI0467
OFFSHORE WATERS, HONOLULU, HAWAII
MAMALA BAY, ISLAND OF OAHU, HAWAII
25 SEPTEMBER 1995

SITE NAMES: This offshore site has been referred to as Offshore Waters, Honolulu, Hawaii, the region near the dredge spoil dump sites, or as Corps of Engineers Sites 3 and 3A due to a Corps of Engineers benthic survey conducted in 1977 (figures 1 and 2).

LOCATION: The sites consist of 2 circles with a 1000 yard radius with central points at 21° 14.8' N. by 157° 55.84' W. and 21° 12.81' N. by 157° 55.92' W. The survey area lies between four to seven miles south of the Honolulu Airport reef runway. Water depth varies from 430m to 525 meters.

SITE HISTORY: During a COE-sponsored benthic survey in 1977, research personnel recovered canisters of a liquid which caused severe chemical burns. In addition, research personnel recovered 1500 lbs of military ordnance including a live 300 lb depth charge.

There are published newspaper accounts of bazooka rockets and other ordnance washing ashore at Ala Moana Beach Park, approximately 4 miles from the surveyed area.

SITE SURVEYS: Side-scan sonar and videocamera surveys were conducted from the University of Hawaii research vessels R/V Kila and R/V Moana Wave.

1. Hi-8 videotape of the seabed identified 43 possible ordnance hazards.
2. High-resolution sidescan sonar gave preliminary evidence that the sonar records would be effective at detecting ordnance-sized manmade objects. Subsequent analysis proved this to be wrong. The resolution was insufficient to detect any ordnance-sized objects. In fact, we were only able to detect significant topographic features that were later confirmed with the video footage.

CATEGORY OF HAZARD: OEW.

SITE SURVEY SUMMARY SHEET
FOR
DERP - FUDS SITE 3 NO. H09HI0466 and SITE 3A NO. H09HI0467
OFFSHORE WATERS, HONOLULU, HAWAII
MAMALA BAY, ISLAND OF OAHU, HAWAII
25 SEPTEMBER 1995
(continuation)

PROJECT DESCRIPTION: There is one potential project at the surveyed site. Further ordnance (OEW) may be distributed in other regions towards shore.

1. OEW. Canisters of chemical weapons and explosive waste were recovered from these sites in the course of environmental surveys undertaken on behalf of the COE in 1977. The present investigations have confirmed the locations of additional OEW and have demonstrated that the affected area is much larger than previously believed. Furthermore, it appears that the OEW extends into considerably shallower water and closer to shore than originally predicted. For these reasons, additional inventory work shoreward of the current surveys would be required to assess the extent of contamination and thus the potential hazards to that area.

AVAILABLE STUDIES AND REPORTS: See Appendix ____.

PA POC: Helene Takemoto, CEPOD-ED-ME, (808) 438-6931.

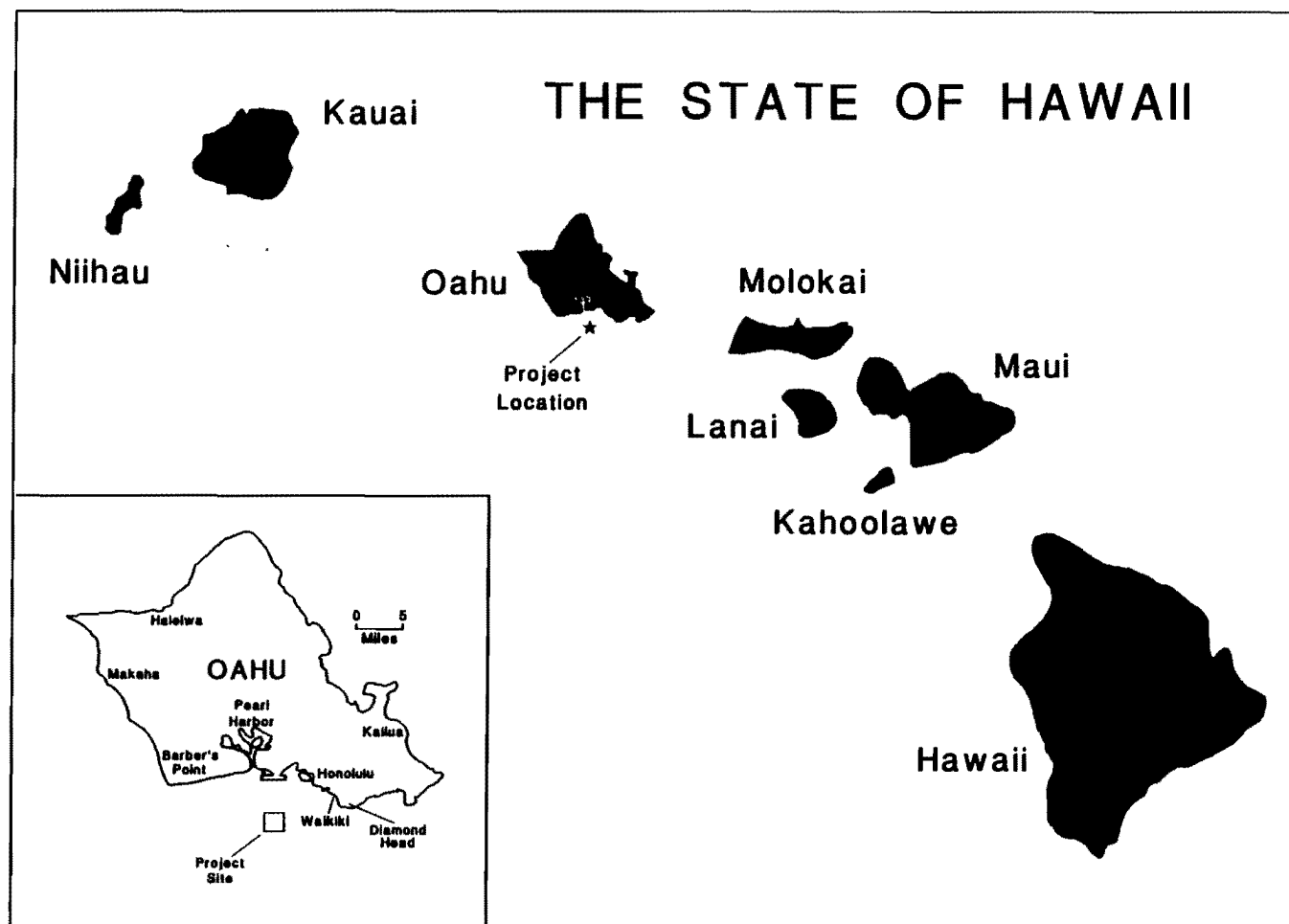


Figure 1. Location of FUDS Study Site 3A (H09HI0467).

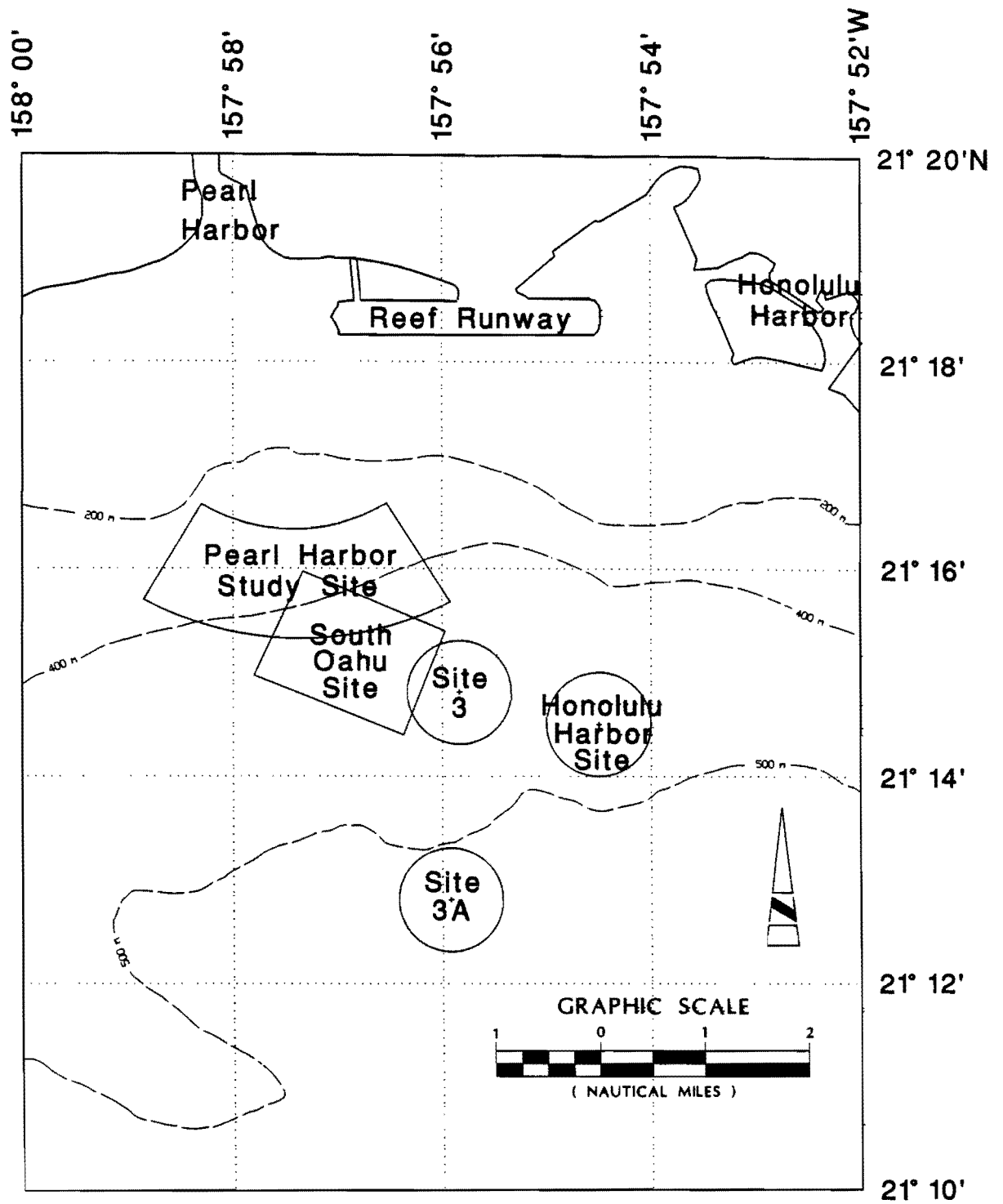


Figure 2. Location of FUDS Study Site 3A (H09HI0467) and its relation to FUDS Site 3 (H09HI0466) and dredge spoil disposal sites in Mamala Bay, Honolulu, Hawaii.

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
FINDINGS AND DETERMINATION OF ELIGIBILITY
OFFSHORE WATERS, HONOLULU, HAWAII
MAMALA BAY, ISLAND OF OAHU, HAWAII
SITE 3A - NO. H09HI0467

FINDINGS OF FACT

1. Site 3A contains approximately 650 acres. Ordnance has been observed over an area at least twice that size. The site lies offshore of Honolulu, Hawaii in State waters. No lease, easement, permit, or other legal document granting use of the waters to the military for disposal of ordnance has been issued.
2. The site is know as Honolulu Site 3A. The persons responsible for dumping the ordnance are unknown. The ordnance is all of military (DOD) origin and is scattered over the entire area of Site 3A and beyond an unknown distance. The present study has produced high resolution videotape documentation of 22 separate items that have been identified as various types of military ordnance.
3. The site is the property of the State of Hawaii. It was never declared excess or transfered to the military. Since there are no deeds or transfer papers for use of the site by the military, there are no restrictions, recapture clauses, restoration provisions, maintenace clauses or any termination agreements. There have been no intervening owners that could have contributed to the military waste. The known locations of the OEW are between 2.25 and 6 miles off the southern shore of the island of Oahu, Hawaii in water depths ranging from 250 to 530 meters. Neither the seaward extent nor shoreward boundaries of the military wastes have been confirmed.

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by the Department of Defense. It is therefore eligible for the Defense Environmental Restoration Program - Formerly Used Defense Sites established under 10 USC 2701 et seq.

Date

ROBIN R. CABABA
Colonel, EN
Acting Commander

PROJECT SUMMARY SHEET
FOR
DERP - FUDS OEW PROJECT
SITE 3A NO. H09HI046701
OFFSHORE WATERS, HONOLULU, HAWAII
MAMALA BAY, ISLAND OF OAHU, HAWAII
28 FEBRUARY 1996

PROJECT DESCRIPTION: The initial site was designated on the basis of documentation of OEWs inadvertently recovered by researchers conducting surveys of the benthic environment in 1977. At that time, serious injuries were sustained by several researchers and crew members when canisters of chemical ordnance were unavoidably collected in their bottom trawl nets and unknowingly brought on board the ship. In addition to the chemical wastes, some 1500 lbs. of ordnance was also collected in 1977, including a 300 lb. depth charge. Our recent studies have documented, through high resolution videotapes, numerous examples of additional OEW both in the study site as well as in the surrounding areas.

PROJECT ELIGIBILITY: Given the nature of the materials recovered and videotaped, it seems readily apparent that the OEW reflects military use and contamination of state lands and waters.

POLICY CONSIDERATIONS: The historical records of at sea disposal of explosives and ordnance, and both recent and past video footage of OEW suggests that the extent of contamination by OEW is much greater than originally assumed. Given the documentation of the ordnance, particularly those pieces found north of the designated study site 3A, it would seem both prudent and necessary for the government to extend the inventory to include the waters between the 50 meter and 300 meter range just seaward of Pearl and Honolulu Harbors.

PROPOSED ACTIVITIES: Proposed activities include the continuation of the present video surveys to inventory ordnance in the coastal waters from 50 to 300 meters depth immediately north of Site 3A and just seaward of Pearl and Honolulu Harbors.

RAC: Attached herewith.

PA POC: Helene Takemoto, CEPD-ET-ES, (808) 438-6931.

RISK ASSESSMENT PROCEDURES FOR
ORDNANCE AND EXPLOSIVE WASTE (OEW) SITES

Site Name: **Offshore Waters Honolulu, Hawaii**
Site Location: **Mamala Bay, Oahu, HI**
DERP Project #: **Site 3A No. H09HI0467**
Date Completed: **February 28, 1996**

Rater's Name: **Jacquelin N. Miller**
Phone No: **(808) 956-7361**
Organization: **Environmental Center, University of Hawaii**
RAC Score: **4**

OEW RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD-882C and AR385-10. The RAC score will be used by CEHND to prioritize the remedial action at Formerly Used Defense Sites. The OEW risk assessment should be based upon best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews and measurements. This information is used to assess the risk involved based upon the potential OEW hazards identified at the site. The risk assessment is composed of two factors, **hazard severity** and **hazard probability**. Personnel involved in visits to potential OEW sites should view the CEHND videotape entitled "A Life Threatening Encounter: OEW."

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE
(Circle all values that apply)

VALUE

A. Conventional Ordnance and Ammunition	(10)
Medium / large Caliber (20 mm and larger)	(10)
Bombs, Explosive	(10)
Grenades, Hand and Rifle, Explosive	10
Landmines, Explosive	10
Rockets, Guided Missiles, Explosive	10
Detonators, Blasting Caps, Fuzes, Boosters, Bursters	6
Bombs, Practice (w/spotting charges)	6
Grenades, Practice (w/spotting charges)	4
Landmines, Practice (w/spotting charges)	4
Small Arms (.22 cal - .50 cal)	(1)

Conventional Ordnance and Ammunition
(Select the largest single value)

10

What evidence do you have regarding conventional OEW?

Documented recovery of depth charges and canisters believed to contain mustard gas during environmental surveys conducted in 1977.
Records of visual observations of bombs, rockets, depth charges, etc. from videotapes acquired in 1994, 1995.

B. Pyrotechnics (For munitions not described above)	
	VALUE
Munition (Container) Containing White Phosphorus (WP) or other Pyrophoric Material (i.e., Spontaneously Flammable)	10
Munition Containing A Flame or Incendiary Material (i.e., Napalm, Triethylaluminum Metal Incendiaries)	6
Flare, Signals, Simulators, Screening Smokes (other than WP)	④
Pyrotechnics Value (Select the largest single value)	<u>4</u>

What evidence do you have regarding pyrotechnics?

Documented recovery of depth charges and canisters believed to contain mustard gas during environmental surveys conducted in 1977. Records of visual observations of bombs, rockets, depth charges, etc. from videotapes acquired in 1994, 1995.

C. Bulk High Explosives (Not an integral part of conventional ordnance; uncontainerized.)	
	VALUE
Primary or Initiating Explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)	10
Demolition Charges	10
Secondary Explosives (PETN, Compositions A, B, C, Teteryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	8
Military Dynamite	6
Less Sensitive Explosives (Ammonium Nitrate, Explosive D, etc.)	3
High Explosives (Select the largest single value)	<u>0</u>

What evidence do you have regarding bulk explosives?

None.

D. Bulk Propellants (Not an integral part of rockets, guided missiles, or other conventional ordnance; uncontainerized)

VALUE

Solid or Liquid Propellants

6

Propellants (Select the largest single value)

0

What evidence do you have regarding bulk propellants?
None.

E. Chemical Warfare Material and Radiological Weapons

VALUE

Toxic Chemical Agents
(Choking, Nerve, Blood, Blister)

(25)

War Gas Identification Sets

20

Radiological

15

Riot Control Agents
(Vomiting, Tear)

5

Chemical and Radiological
(Select the largest single value)

25

What evidence do you have regarding chemical/radiological OEW?
Documented recovery of depth charges and canisters believed to contain mustard gas during environmental surveys conducted in 1976-77. Records of visual observations of bombs, rockets, depth charges, etc. from videotapes acquired in 1994, 1995.

=====

TOTAL HAZARD SEVERITY VALUE

39

(Sum of Largest Values for A through E -- Maximum of 61)

Apply this value to Table 1 to determine Hazard Severity Category.

TABLE 1

HAZARD SEVERITY*

Description	Category	Hazard Severity Value	
CATASTROPHIC	I	21 and greater	<u>39</u>
CRITICAL	II	10 to 20	
MARGINAL	III	5 to 9	
NEGLIGIBLE	IV	1 to 4	
**NONE			0

***Apply Hazard Severity Category to Table 3.**

**** If Hazard Severity Value is 0, you do not need to complete Part II. Proceed to Part III and use a RAC score of 5 to determine your appropriate action.**

Part II. Hazard Probability. The probability that a hazard has been or will be created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF OEW HAZARD
(Circle all values that apply)

A. Locations of OEW hazards	VALUE
On the surface	5
Within Tanks, Pipes, Vessels or Other Confined Locations	4
Inside Walls, Ceilings, or Other Parts of Buildings or Structures	3
Subsurface	②
Location (Select the largest single value)	<u>2</u>

What evidence do you have regarding location of OEW? Documented recovery of depth charges and canisters believed to contain mustard gas during environmental surveys conducted in 1976-77. Records of visual observations of bombs, rockets, depth charges, etc. from videotapes acquired in 1994, 1995.

- B. Distance to nearest inhabited locations or structures likely to be at risk from OEW hazard (roads, parks, playgrounds, or buildings).

	VALUE
Less than 1250 feet	5
1250 feet to 0.5 miles	4
0.5 miles to 1.0 miles	3
1.0 miles to 2.0 miles	2
Over 2 miles	①
Distance (Select the largest single value)	<u>1</u>

What are the nearest inhabited structures?

Coastal dwellings, hotels, piers, wharfs, etc. approximately 2.5-5 miles north of the area.

-
- C. Numbers of buildings within a 2-mile radius measured from the OEW hazard area, not the installation boundary.

	VALUE
26 and over	5
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	①
Number of Buildings (Select the single largest value)	<u>0</u>

Narrative. No buildings within 2-mile radius from the oew hazard area.

D. Types of Buildings (within a 2-mile radius)

	VALUE
Educational, Child Care, Residential, Hospitals, Hotels, Commercial, Shopping Centers	5
Industrial, Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
No Buildings	0
Types of Buildings (Select the single largest value)	<u>0</u>
Describe types of buildings in the area. <u>None within 2 mile radius.</u>	

E. Accessibility to site refers to access by humans to ordnance and explosive wastes. Use the following guidance:

BARRIER	VALUE
No barrier or security system	5
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier, (any kind of a fence in good repair), but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security guard, but no barrier	2
Isolated site	①

A 24-hr surveillance system (e.g. television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility; or
 An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and
 a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).

Accessibility (Select the single largest value) 1

Describe the site accessibility. Located on the sea floor at depths of 450-530 meters.

- F. Site Dynamics - This deals with the site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion by beaches or streams, increasing land development that could reduce distances from the site to inhabited areas or otherwise increase accessibility.

	VALUE
Expected	5
None Anticipated	(0)
Site Dynamics (Select the largest single value)	<u>0</u>
Describe the site dynamics. <u>None.</u>	

TOTAL HAZARD PROBABILITY VALUE 4
 (Sum of Largest Values for A through F - Maximum of 30)

Apply this value to Hazard Probability Table 2 to determine Hazard Probability Level.

TABLE 2

HAZARD PROBABILITY

Description	Level	Hazard Probability Value
FREQUENT	A	27 or greater
PROBABLE	B	21 to 26
OCCASIONAL	C	15 to 20
REMOTE	D	8 to 14
IMPROBABLE	(E)	less than 8

*Apply Hazard Probability Level to Table 3.

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table 3. Enter with the results of the hazard probability and hazard severity values.

TABLE 3

Probability Level		FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity Category:						
CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	1	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

RISK ASSESSMENT CODE (RAC)

- RAC 1 Imminent Hazard -- Expedite INPR -- Immediately call CEHND-ED-SY commercial 205-955-4968 or DSN 645-4968.
- RAC 2 High priority on completion of INPR -- Recommend further action by CEHND.
- RAC 3 Complete INPR -- Recommend further action by CEHND.
- RAC 4 Complete INPR -- Recommend further action by CEHND.
- RAC 5 Recommend no further action. Submit NOFA and RAC to CEHND.

=====

Part IV. Narrative. Summarize the documented evidence that supports this risk assessment. If no documented evidence was available, explain all the assumptions that you made.

Evidence of the presence of unexploded ordnance in the offshore waters of Honolulu and Pearl Harbors was originally documented in a Corps of Engineers Environmental Assessment study undertaken in 1976-1978. Several people were seriously injured (burned) by a yellow liquid leaking from canisters recovered in a bottom trawl. The military made a tentative identification at that time that the canisters contained mustard gas. In addition to the canisters, some 1500 pounds of shells and depth charges were also recovered in a subsequent trawl. Most recently, we have obtained confirmatory video footage of 22 pieces of ordnance in the same general area as the materials recovered in the environmental surveys. The ordnance that has been detected during this inventory has been in water depths of 250-530 meters. At these depths the danger to humans or structures is exceedingly remote. However, since the videos indicate that many of the ordnance objects (if not all) remain at the surface of the seafloor, despite the many years of dumping of dredged material in the general area, it seems quite likely that if ordnance does occur in shallower, nearshore waters that it has not been buried and thus may present a potential hazard.

COST ESTIMATE

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
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DERP - FUDS OEW PROJECT
SITE 3A NO. H09HI0467
28 FEBRUARY 1996

The attendant DD Form 1391 contains a cost estimate to remediate the Offshore Waters, Honolulu Site 3A located in Mamala Bay, Southern Oahu pursuant to RAC 4 requirements.

REMEDIAL DESIGN

1. ENVIRONMENTAL COMPLIANCE. Environmental compliance includes the preparation of permits that may be required for operations in the coastal water of the State of Hawaii. These permits may include, Fish and Wildlife and other federal, state, or local environmental quality control requirements including Section 7 threatened/endangered species consultation, and NEPA documents.

Cost Breakdown:

Preparation of Permits, Clearances	<u>150,000</u>
Total	150,000

2. ENGINEERING AND DESIGN. Work plans, site safety and health plans, and other plans as required by the proponent.

Cost Breakdown:

Preparation of Plans, Reports	<u>150,000</u>
Total	150,000

REMEDIAL ACTION

1. MOBILIZATION AND PREPARATORY WORK. Mobilization of equipment and facilities.

Cost Breakdown:

Mobilization of Ships, Equipment & Facilities	<u>20,000</u>
Total	20,000

COST ESTIMATE

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(continuation)

2. SURVEY, DISCOVERY, INVENTORY, DEMOLITION AND REMOVAL. The cost estimate for the ordnance survey and removal assumes that the ordnance is present throughout Site 3A. However, our surveys indicate that it likely extends to twice that area, or a total of about 1300 acres. Given the depth of the location of the ordnance and its age and condition, there appears to be no safe way to remove the ordnance from the bottom and move it to the surface for transport to a disposal site. The deteriorating condition of the munitions and the pressures involved would make transport to the surface unacceptably hazardous. Demolition on site would be possible using remotely operated vehicles (ROV's) to plant appropriate sized demolition charges. Based on the inventory work to date, we can estimate the density of the ordnance at 1 per acre hence approximately 650 ordnance items can be expected to occur in Site 3A. The OEW clearance effort is based on a team of 20. This would include a video survey team, ROV specialists and technicians, GPS position specialists, and OEW support specialists. Discovered ordnance would be inventoried on video tape, marked using differential GPS positioning systems, tagged with an acoustic transponder, and detonated in place by demolition charges planted by the ROV. Quality assurance and quality control would be assured by follow-up video images of the detonation site.

Cost estimates are based on removal of 650 ordnance items in Site 3A, (density of 1/acre) and assuming demolition of 2 items per day.

Cost Breakdown (Site 3A only):

Ship time @ 8000/day * 325 days	2,600,000
Survey Team (20) @ 12,000/day * 325 days	3,900,000
Equipment (ROV, DGPS, Video, Transponders, Explosives)	<u>2,500,000</u>
Total	9,000,000

Note: Ordnance has been observed over an area at least twice the size of Site 3A, or approximately 1300 acres. Cost figures shown reflect cost/650 acres only.

COST ESTIMATE

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(continuation)

3. DISPOSAL. Disposal is not feasible without transport to the surface. This, in turn, is not feasible due to the condition of the ordnance and pressure differences that the munitions would be subjected to in the moving process.

4. DEMOBILIZATION.

Cost Breakdown:

Demobilization of Equipment and Return Shipping	<u>20,000</u>
Total	<u>20,000</u>

5. CONTINGENCY (10% of total remedial cost)	934,000
6. EDC	75,000

1. COMPONENT ARMY	FY 19 ____ MILITARY CONSTRUCTION PROJECT DATA			2. DATE 28 Feb 1996	
3. INSTALLATION AND LOCATION Offshore Waters of Honolulu, Hawaii			4. PROJECT TITLE Site No. 3A		
5. PROGRAM ELEMENT DERP-FUDS	6. CATEGORY CODE OEW	7. PROJECT NUMBER H09HI0467	8. PROJECT COST (\$000) \$9,505.90		
9. COST ESTIMATES					
ITEM		U/M	QUANTITY	UNIT COST	COST (\$000)
REMEDIAL DESIGN					
1. Environmental Compliance Permit Requirements		LS			150.0
2. Engineering and Design		LS			150.0
REMEDIAL ACTION					
1. Mobilization		LS			20.0
2. Demolition/Removal		LS			9,000.0
3. Disposal		LS			NA
4. Demobilization		LS			20.0
5. Contingency (10%)		LS			934.0
S&A (8.5%)					793.9
EDC					75.0
TOTAL					11,142.9
10. DESCRIPTION OF PROPOSED CONSTRUCTION Perform surface and limited subsurface survey and clearance of OEW.					

FIELD SURVEYS

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM FOR FORMERLY USED DEFENSE SITES OFFSHORE WATERS, HONOLULU, HAWAII MAMALA BAY, ISLAND OF OAHU, HAWAII DERP - FUDS SITE 3A NO. H09HI0467 FEBRUARY 28, 1996

Sonar:

An EG&G DF 1000 sidescan sonar was used to detect high acoustic reflectivity surface objects over the entire area of site 3A, as well as some coverage of the area just south of the site (fig. 3). Line spacing was 300m. The sonar uses two each 100khz and 400khz beams, and reportedly provides across-track resolution of $<.1\text{m}$, and along-track resolution $< 0.5\text{m}$. Nominal resolution was thus expected to be $(.5\text{m})^2$. In practice, this resolution was not achieved.

Data collection was observed real-time and was processed into .5m/pixel gray scale mosaics presenting an aerial view of the survey area (Appendix B). Numerous large ($> 10\text{m}$) objects were detected. Small individual objects appeared singly and in groups distributed throughout the survey area but were of insufficient resolution to be useful in the identification of ordnance. The large objects were clustered in the northern region of Site 3A.

The large irregular features recorded on the side scan images in the northern area of Site 3A proved to be massive coral or basaltic outcrops with 30 meter or more vertical walls and generally rugged, irregular, terrain.

Video:

Approximately 12.75 miles of video footage was obtained using a Hi-8 format fiber optic videocamera with a pressure-capable housing suspended from a fiber optic cable approximately 2-5 meters above the seabed. Two halogen lights on booms provided the illumination. The camera's field of view encompasses from one to four meters depending on its height (altitude) above the sea floor. Figure 4 illustrates the paths of seabed video taped and analyzed by University of Hawaii researchers and DEI consultants. Many objects were identified ranging from beer bottles to large electric motors.

Video footage taken by the Hawaii Undersea Laboratory (HURL) provided additional documentation of the presence of unexploded ordnance. Twenty-two ordnance hazards were identified and are listed in Table 1, and their locations are shown on Figure 5 (Appendix B).

Hawaii Undersea Research Laboratory Videos. The Hawaii Undersea Research Laboratory (HURL) of the University of Hawaii maintains and operates two submersibles that have in the past been used near the Mamala Bay disposal sites. The *Makali'i* was used from 1981 through 1986 and made 13 dives as part of a dredge spoil study project. Six dives were made with the *Pisces V* of which one was made in approximately 1000 feet of water north of the study area in 1992.

Voice transcripts and transcribed video logs from all dives in the general vicinity of the study site were reviewed for reference to ordnance. Videos of the dives where ordnance were sighted were viewed and still images were made of all ordnance identified. The sound tracks of the video tapes made by the submersible crew frequently discussed seeing ordnance that was not necessarily filmed by their cameras. Hence, examples of references to ordnance in the voice transcripts are submitted with the still images as additional data (Appendix B).

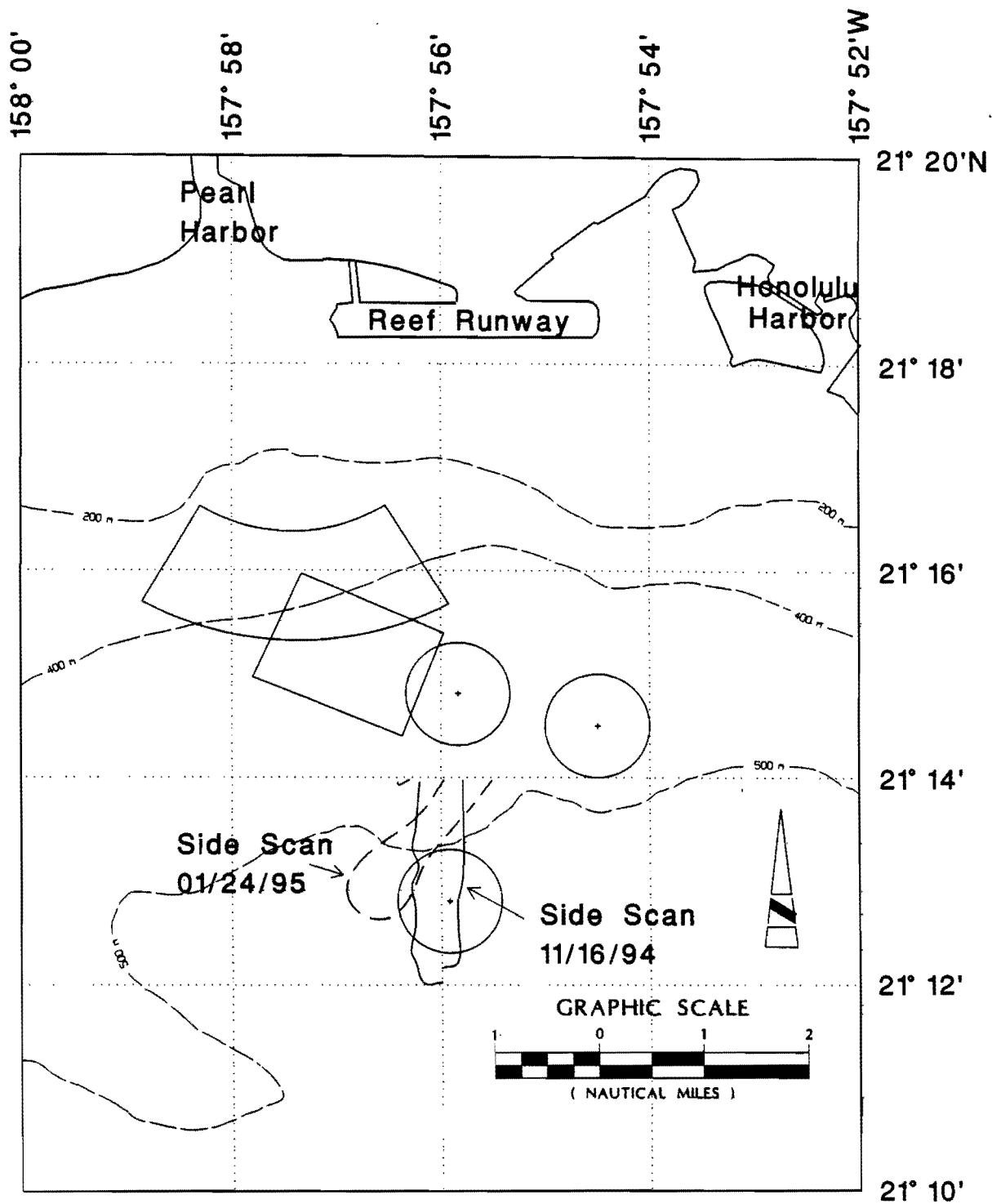


Figure 3. Side scan sonar cruise locations.

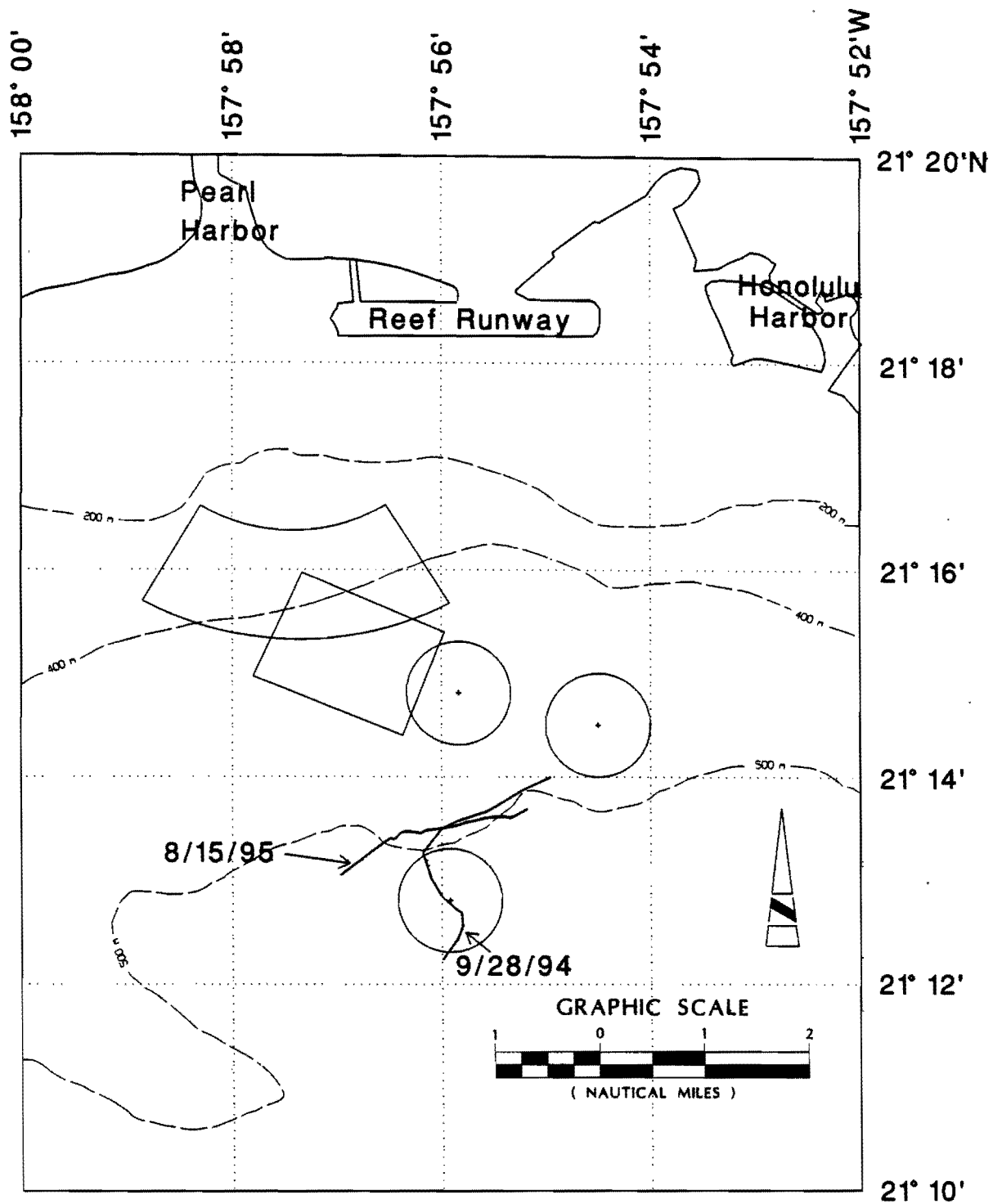


Figure 4. Location of video transects made on September 28, 1994 and August 15, 1995.

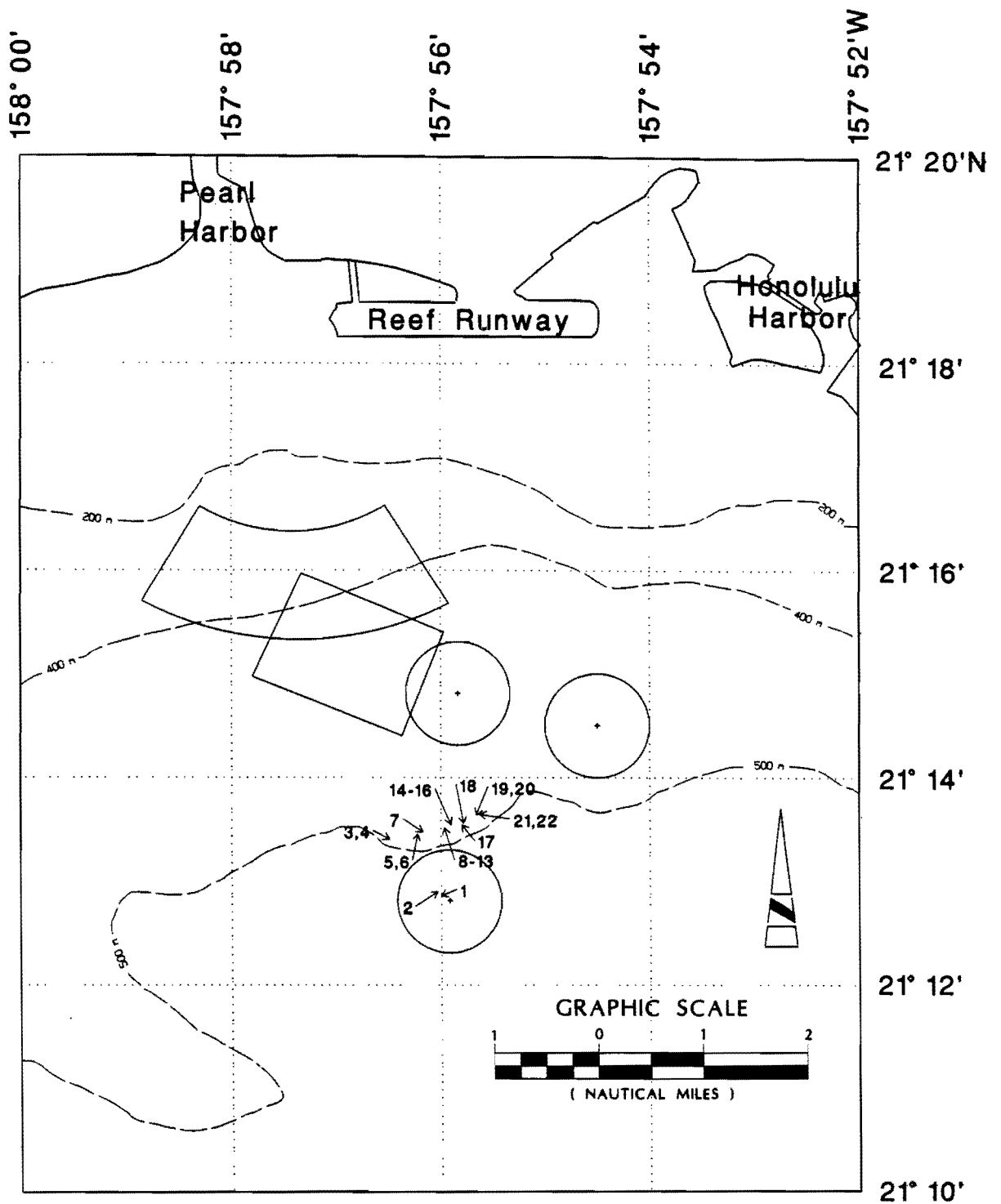


Figure 5. Location of ordnance and explosive wastes as recorded on videotape. Numbers correspond to ordnance identifications listed in Table 1 as provided by Donaldson Enterprises, Explosive Ordnance Disposal Specialists.

FUDS/FOCUS Video/Ordnance Locations				
Site 3A				
Item No.	Description	Longitude	Latitude	Survey
		(157 deg)	(21 deg)	
1	Naval Projectile, 8" to 16", High-Capacity Round.	56.00	12.86	9/28/94
2	Large Cylinder, Possibly A/C Rocket Motor or Container.	56.03	12.90	9/28/94
3	Projectile.	56.46	13.40	8/15/95
4	Aircraft Rocket Launcher.	56.49	13.41	8/15/95
5	Projectile.	56.22	13.46	8/15/95
6	Barrage Rocket.	56.22	13.46	8/15/95
8	7.2" Barrage Rocket, a.k.a. "Mousetrap."	55.99	13.50	9/28/94
8	Linked Ammunition.	56.17	13.48	8/17/95
9	Naval Projectile, 8" to 16".	55.98	13.51	9/28/94
10	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.98	13.51	9/28/94
11	M 26 Flare Bomb, expended.	55.97	13.52	9/28/94
12	M 26 Flare Bomb, expended.	55.96	13.52	9/28/94
13	M 26 Flare Bomb, expended.	55.95	13.53	9/28/94
14	Large Cylinder, Possibly A/C Rocket Motor or Container.	55.90	13.55	9/28/94
15	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.89	13.56	9/28/94
16	Ammo Box With Growth or Spillage.	55.88	13.57	9/28/94
17	Rocket Motor.	55.80	13.55	8/15/95
18	Rocket Launcher—Multiple Tubes.	55.78	13.56	8/15/95
19	Rocket Motor.	55.66	13.64	9/28/94
20	Rocket Motor.	55.66	13.64	9/28/94
21	Munitions Pod With Fins.	55.65	13.64	9/28/94
22	Munitions Pod With Fins, No ID.	55.63	13.65	9/28/94

Table 1. Location and description of ordnance video taped during FOCUS transects and HURL surveys. Ordnance identified by Donaldson Enterprises.

SOURCES OF INFORMATION

**DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
OFFSHORE WATERS, HONOLULU, HAWAII
MAMALA BAY, ISLAND OF OAHU, HAWAII
SITE 3A NO. H09HI0467
28 FEBRUARY 1996**

DISCUSSION

The purpose of this section was to uncover historical evidence of ordnance disposal at Site 3A in the offshore waters of Mamala Bay, Honolulu, Hawaii. Various military commands were contacted for information regarding possible locations of historical records of ordnance disposal in these waters. Historical files, documents, and the Honolulu newspapers were systematically searched.

Appropriate contacts for the various military commands were obtained through referrals from a superior command to the applicable subordinate command. As a former Navy officer, one member of our staff used his knowledge of the Hawaii naval force structure in locating possible sources of information pertinent to ordnance disposal at sea.

Historical research proved to be frustrated by a lack of data, probably caused by the long time span (~ 50 years) involved. It was found that newspapers provided useful accounts of ordnance discoveries by the public, or of major incidents, but little record of ordnance inventories seemed to be available. Beginning in the mid-1970's, it appears that more data was available. This may be due to the United State's environmental awakening, administrative rules governing records-keeping, or both. The nature of "disposal" may have contributed to the paucity of information since there was probably little concern to keep records of items being discarded.

REFERENCES

1. Environmental Surveys of Deep Ocean Dredged Spoil Disposal Sites in Hawaii. Prepared for U.S. Army Corps of Engineers, Honolulu, Hawaii, by Neighbor Island Consultants, Contract No. DACW84-76-0032, June 1977.
2. Federal Hazardous Waste Sites in the State of Hawaii, Hearing before the Committee on Governmental Affairs, United States Senate, August 20, 1990. U.S. Government Printing Office, Washington, DC, 1992.
3. Hawaii War Records Depository, (59 microfilms covering 1941-1945). Hamilton Library, University of Hawaii at Manoa, Honolulu, Hawaii.
4. Honolulu Advertiser Newspaper, Honolulu, Hawaii, 1929 - 1994.
5. Honolulu Star-Bulletin Newspaper, Honolulu, Hawaii, 1929 - 1994.
6. Submerged Cultural Resources Study, USS Arizona Memorial and Pearl Harbor Historic Landmark, Daniel J. Lenihan, ed. National Park Service, U.S. Department of the Interior, 1990.
7. United States Coast Pilot 7, Pacific Coast, California, Oregon, Washington, and Hawaii, 10th ed. (June 15, 1968), U.S. Department of Commerce. U.S. Government Printing Office, Washington, DC, 1968.
8. World Naval Weapons Systems, Norman Friedman. Naval Institute Press, Annapolis, Maryland, 1989.
9. 40 Code of Federal Regulations, Section 227-8.

LOCAL NEWSPAPER ARTICLES

Honolulu Advertiser = HA

Honolulu Start-Bulletin = HSB

The Hawaii Weekly = THW

<u>mo.</u>	<u>dy.</u>	<u>yr.</u>	<u>Paper</u>	<u>Title of Article</u>	<u>Details</u>
1	28	1933	HSB	FUNDS TO STORE EXPOSIVES HERE SAFELY SOUGHT	Use of Salt Lake Crater, Ford Island, and Bishop's Pt. for storage of bombs.
7	5	1946	HA	SHELLS STREW RABBIT ISLE, SCENE OF FATAL EXPLOSION*	DUD shell cleanup is urged.
7	23	1946	HSB	NAVY GIVES WARNING OF DANGER AREAS...	Unexpended projectiles may remain near bombing target rafts anchored off Barbers Point.
9	15	1946	HA	BOMB DISPOSAL SQUADS EXPLODE DUD MISSILES	"Kahuku to Koko Head squads worked to rid the ocean bottom of missiles fired during war time practice games."
6	20	1954	THW	HAWAII'S WAR AGAINST THE DUD	"From 1946 to 1948 disposal teams dumped empty casings out at sea."
5	10	1956	HA	LIVE ROCKETS FOUND OFF ALA MOANA	Two 3.5 inch bazooka rockets, anti tank projectiles found beyond the reef.
8	23	1956	HSB	NAVY BOMB DISPOSAL UNIT CAN AFFORD NO MISTAKES	"We dispose of most bombs by blowing them up on the spot."
11	8	1956	HSB	MINES ON WATER STILL WAGE WAR...	Eleven WW II mines washed ashore in 18 months on Hawaii's Beaches.
1	15	1957	HSB	DEMOLITION TEAM REMOVES DEVICE	Harbor closed two hours. Demolition teams removed a floating mine from Honolulu Harbor.
8	19	1963	HSB	DIVERS SALVAGE ANCIENT CANNON	Russian ??600 lb. cannon found in Honolulu Harbor at 35 ft. depth, 100 yds. from channel entrances.
11	7	1965	HSB	EODU MEN DIVE DEEP TO DEFUSE EXPLOSIVES	Training of EOD personnel.

5	23	1966	HSB	UNDERSEA EXPLOSION SLATED TOMORROW	Reference to disposal of obsolete ammunition at sea by the Navy.
8	22	1966	HSB	BOMB BLOWN UP AT MAKUA BEACH	WW II, Mark 37, 500 lb. bomb found in 15 ft. of water at Makua Beach.
4	21	1970	HSB	NAVY TO DETONATE BOMBS ON TINY ISLAND TOMORROW	Disposal of live bombs on Mokuhooniki Island off Molokai resulting from bombing practice.
9	15	1970	HSB	RADIOACTIVE WASTE IN PEARL HARBOR	Discharge of radioactive waste water from nuclear submarines into Pearl Harbor.
4	1	1972	HA	BIG PEARL HARBOR CLEANUP UNDERWAY	General "clean-up" of debris, litter and wreckage, in Pearl Harbor.
5	10	1973	HA	1941 JAPANESE BOMB RECOVERED	Navy divers recovered 1941 bomb 70 ft. deep, 1,000 ft. off Waialua. Wahiawa police requested that Navy dive team check out bomb report.
3	31	1977	HA	BOMB FOUND AT PEARL	Bomb discovered on Ford Island thought to be from 1941 Pearl Harbor Attack.
6	9	1977	HSB	CONSTRUCTION WORKERS FIND A DUMMY BOMB	A 2000 lb. bomb was unearthed near Pearl Harbor and was taken to Makua for disposal. Bomb turned out to be a dud.
6	19	1982	HSB	MORE OLD BOMBS DETONATED*	Kent Warshauer to write a book on the impact of military ordnance here in WWII shed light on the findings.
5	3	1991	HA	PEARL HARBOR YIELDS WWII TORPEDO	A Japanese aerial torpedo with 600 lb. of explosives was dredged up near Ford Island. It will be detonated at sea.
5	4	1991	HA	INOUE: KAHOO LAWE FACES HURDLES	Opposition of Congress to return of Kahoolawe to state and potential for future military use.
5	23	1991	HA	A TORPEDO'S TALE--IN TIME FOR 50TH	Remains of Japanese torpedo dropped on December 7, 1941, recovered from Pearl Harbor.

Addition of Pearl Harbor to EPA's Superfund List and use of Department of Defense monies to clean up hazardous waste sites at Navy facilities on Oahu.

**Articles regarding disposal practices*

TEXTS, JOURNALS, REPORTS other than newspapers:

- 1 Committee on Governmental Affairs, U.S. Senate, 8/20/90
FEDERAL HAZARDOUS WASTE SITES IN THE STATE OF
HAWAII COMPLIANCE, CLEANUP AND WASTE MANAGEMENT
- 2 Recommendations for the disposal of Chemical agents
and Munitions. THE CHEMICAL STOCKPILE.
National Research Council, Washington D.C., 1994
- 3 MANAGEMENT AND DISPOSITION OF EXCESS WEAPONS
National Academy Press, Washington D.C., 1994
- 4 HEAVY METALS SURVEY AND THE ESTIMATION OF
SEDIMENT YIELD: MAUKA MILITARY RESERVATION
A thesis by Alvin Char, MPH, University of Hawaii, 1977

"the NEW YORK and the NEVADA ships were towed to sea and used as torpedo targets and then sunk off of Pearl Harbor in July of 1948."

Ocean water quality studied in this report covers:
Sediment yield delivered to nearshore ocean waters.
Concentrations of metals found in disposal site soils.
Potential runoff during heavy rains.

Pg. 43. "The Navy, on behalf of the Armed Forces, established a practice of ocean dumping as the safest and most effective method of disposal."

CONFERENCE, VIDEO OF

- 1 WEAPONS TECHNOLOGY AND ETHICS-
CONVENTIONAL WEAPONS DISPOSAL ON OAHU.
Pat Tummons and John Harrison, 1994.

Weapons disposal may occur at the end of training sessions, but will be classified as training, not weapons disposal. Disposal during training is not regulated.

SOURCES AND TOPICS SEARCHED

NEWSPAPER INDEX:

- * The Hawaii Weekly (THW)
- * Honolulu Advertiser (HA)
- * Honolulu Star-Bulletin (HSB)
1928-1984 Bound guide to articles
1991-1994 Public Library Terminal
Hawaii State Library

Topic Headings Searched:

Accidents
Ammunition
Army
Arsenals Waste
Artillery
Bombs
Dumping
Explosions
Explosives
Hazardous Waste
Honolulu Harbor
Military
Mines
Missiles
Munitions
Ocean Dumping
Ordnance
Pearl Harbor
Pollution
U.S. Armed Forces
U.S. Navy
U.S. Ordnance Disposal Units
Waste
Weapons
West Loch
World War

UNIVERSITY LIBRARY SYSTEMS:

- * Hamilton: Gov. Docs, Hawaii/Pacific Reserves
- * Governmental Publications
- * Sinclair Audio Visuals

Topic Headings Searched:

Arsenals Waste Disposal
Defense Sites Hawaii
Disposal of Chemical Weapons
Explosive Ordnance Disposal
Formerly Used Defense Sites Hawaii
Hazardous Waste Sites Hawaii
Military Bases Waste Disposal
Naval Ordnance Disposal
Obsolete Conventional Ordnance Disposal
Toxic Explosives
United States Armed Forces Ordnance Facilities
Waste Disposal in Ocean
Weapons Disposal Hawaii
Weapons Testing Areas Hawaii

INSERT
NEWSPAPER ARTICLES

INTERVIEWS

U.S. Military Agencies Contacted for Historical Information:

1.
Command: United States Navy Pacific Fleet
Title: Explosive Ordnance Disposal / Mine Warfare
Name of Person Contacted: LCDR Gary Rossi, USN.
Contact Method: Telephone inquiry with follow-up calls.
Questioned Concerning: Availability of historical ordnance records, particularly concerning 1940 - 1975.
Results: No records were available. Received sections of LCDR Rossi's thesis regarding ammunition disposal techniques.

2.
Command: United States Navy Pacific Fleet
Title: Public Affairs Officer
Name of Person Contacted: LCDR Betsy Bird, USN.
Contact Method: Two telephone inquiries.
Questioned Concerning: Availability of historical ordnance records, particularly concerning 1940 - 1975. Recommendations of other commands to contact.
Results: Looked through base Public Affairs Office files. Referred to Explosive Ordnance Disposal Detachment, Pearl Harbor.

3.
Command: United States Navy Explosive Ordnance Disposal Detachment, Pearl Harbor
Title: Officer-in-Charge
Name of Person Contacted: LT David Donovan, USN.
Contact Method: Referral by both LCDR Rossi (CINCPACFLT) and LT Nahoopii (OIC Kahoolawe) leading to multiple phone conversations.
Questioned Concerning: Availability of historical ordnance disposal records, particularly concerning 1940 - 1975.
Results: The Detachment only retains recent operational data, not historical data. It was noted that the EOD Detachment usually deals with singular finds of ordnance creating a hazard, not the mass disposal of significant quantities. Referred to United States Naval Historical Center.

- 4.
- | | |
|---------------------------|--|
| Command: | United States Naval Historical Center,
Washington Navy Yard, Washington, DC. |
| Title: | Director, Naval Historical Center, Acting |
| Name of Person Contacted: | Mr. William D. Vance |
| Contact Method: | Telephone inquiries on May 2 and 17, 1995 and
one letter. |
| Questioned Concerning: | Availability of historical ordnance records,
particularly concerning 1940 - 1975. Requested
Command History and daily logs relating to the
F/V <i>Irene Kay</i> recovering ordnance while
conducting the <u>Environmental Surveys of Deep
Ocean Dredged Spoil Disposal Sites in Hawaii</u> . |
| Results: | Received Command History report containing
general information of the EOD Detachment and
summary data for November 1976, but the
Command History had no specific mention of the
survey incident. |
- 5.
- | | |
|---------------------------|---|
| Command: | National Archives, Pacific Region, San Bruno,
CA. |
| Title: | Archivist |
| Name of Person Contacted: | Mr. Bill Green. |
| Contact Method: | Phone inquiries and letter. |
| Questioned Concerning: | Availability of historical ordnance records,
particularly concerning 1940 - 1975. |
| Results: | Received some general information of minimal
usefulness. |
| Command: | United States Naval Magazine, Lualualai, HI |
| Title: | Executive Officer |
| Name of Person Contacted: | LCDR Lucas, USN. |
| Contact Method: | Multiple telephone inquiries with follow-up calls. |
| Questioned Concerning: | Availability of historical ordnance records,
particularly concerning 1940 - 1975. Request that
some "old-timers" still on the staff be consulted.
Availability of data concerning the "weekly barge"
discussed by Commodore Nailer. |
| Results: | No historical data of that period is maintained at
the naval magazine. Discussions with older staff
were inconclusive. |

6.
Command: United States Army Pacific Command
Title: Director, Explosive Ordnance Disposal (formerly Central Ammunition Management Office, Pacific (CAMOPAC))
Name of Person Contacted: Major Kiefer, USA.
Contact Method: Telephone inquiry with follow-up call.
Questioned Concerning: Availability of U.S. Army EOD ordnance records, particularly with emphasis on WW II.
Results: No records available. Referral to U.S. Army Pacific Command Historian and U.S. Army Historical Center.
7.
Command: United States Army Pacific Command
Title: Chief Historian
Name of Person Contacted: Dr. Laird.
Contact Method: Telephone inquiry with follow-up call.
Questioned Concerning: Availability of historical ordnance records, particularly concerning 1940 - 1975.
Results: None. Referred to National Archives.
8.
Command: United States Army Historical Center, Carlisle Barracks, PA.
Title: Historian.
Name of Person Contacted: Ms. Louise Arnold-Friend.
Contact Method: Phone conversations and fax.
Questioned Concerning: Availability of historical ordnance records for the Island of Oahu near Pearl Harbor, particularly concerning 1940-1975.
Results: No applicable records on file.
9.
Command: United States Army Explosive Ordnance Technical Center, Indian Head, MD.
Title: Records Keeper.
Name of Person Contacted: Ms. Ann Cashin.
Contact Method: Phone conversations.
Questioned Concerning: Availability of historical records concerning Pearl Harbor ordnance, particularly during 1940-1975.
Results: No records of interest on file.

OTHER INTERVIEWS

1.

Arizona Memorial, National Park Service

Title: Park Historian, Submerged Cultural Resources.
Name of Person Contacted: Daniel Martinez.
Contact Method: Meeting.
Questioned Concerning: Availability of historical records concerning Pearl Harbor ordnance, particularly during 1940-1975.
Results: No records of interest on file.

2.

**LT Michael K. Nahoopii, USNR
Kahoolawe Ordnance Specialist
Honolulu, HI**

Interview Report: Mr. Michael Nahoopii
Residence: Mr. Nahoopii currently lives in Honolulu, Hawaii.
Dates of interview: May 1, 1995.
Method of interview: Personal.

Background Summary: Mr. Nahoopii recently resigned from active naval service as the Officer-in-Charge of the on-site Kahoolawe ordnance clean-up operations during 1993 and 1994.

LT Nahoopii was assigned to the U.S. Navy Civil Engineering Corps while working on Kahoolawe. During that time he met various contacts within the state's and military's EOD community. He recommended contacting the following individuals and organizations which possibly could provide more information:

**Commander Naval Surface Forces Pacific, San Diego, CA - Possible EOD records.
(Records actually at National Archives, Pacific Region, San Bruno, CA.)**

**Commander Naval Air Forces Pacific, San Diego, CA - Possible EOD records.
(Records actually at National Archives, Pacific Region, San Bruno, CA.)**

Arizona Memorial

(No substantive information. See "Other Interview" #1.)

**Veteran's of Foreign Wars, Oahu Chapter, Honolulu, HI.
(Contacted, received no substantive information.)**

**Veteran's Administration, Honolulu, HI.
(Contacted, received no substantive information.)**

LT Dave Donovan

**Officer-in-Charge
U.S. Navy EOD Detachment, Pearl Harbor.**

(See "Interview" #3.)

CAPT Tom Bernit

**Commanding Officer
Naval Magazine Lualualai**

(See "Interview" #1 with LCDR Rossi.)

We subsequently contacted all these individuals or their successors. LCDR Gary Rossi (Executive Officer at Naval Magazine Lualualai, as well as CINCPACFLT staff officer) recommended that we call a Commodore Nailer, whose useful interview (#3) appears below.

3.

Interview Report:

Commodore R. Nailer, USN (Retired)

Residence:

Commodore Nailer currently lives in Aiea, Oahu, Hawaii.

Dates of interview:

July 5, 1995.

Method of interview:

Telephone.

Background Summary: Commodore Nailer was the first one-star naval Explosive Ordnance Disposal commander assigned to the Pacific Command. He served in that role during 1967-69 and again in 1972.

One job of the naval EOD teams was to respond to ordnance sightings and destroy or defuse the ordnance discovered. The EOD teams were not involved in any large or small-scale ordnance dumping operations. As regards to the study area in the deep ocean outside of Pearl Harbor, he recalls no incidents where his teams responded.

Commodore Nailer also recalls a routine practice where a barge would be filled with ordnance (bombs and shells) at Naval Magazine Lualualai and taken periodically out to sea for disposal over the side. This occurred during his assignment in 1967-69. He does not recall whether the practice continued during his second assignment in the 1970's. He presumes this "weekly barge" dumped its cargo in deep water off the leeward coast of Oahu.

4.

Mr. Byron Donaldson

Mr. Norm Garon

Donaldson Enterprises Inc.

Bomb Disposal Services

45-1055 Kamehameha Highway

Suite 202

Kaneohe, HI 96744

Interview Report:

Mr. Byron Donaldson

Residence:

Mr. Donaldson currently lives in Kaneohe, Hawaii.

Dates of interview:

Various during the period October 1994 - July 1995.

Method of interview:

Personal and telephone.

Background Summary: Mr. Donaldson is a retired U.S. Marine ordnance expert who established Donaldson Enterprises Incorporated, a local ordnance disposal company. DEI was contracted to identify specific items recorded during UH Environmental Center surveys.

Mr. Donaldson recalls hearsay information about large amounts of ordnance and equipment being disposed of at sea, off Oahu, immediately following World War II. This disposal was termed "Operation Roundup" and occurred during the six months after the war ended. He explained that since WW II draftee's terms would expire six-months after V-J day on 2 September 1945, and the war ended more suddenly than expected, a very rapid clean-up operation occurred. Common practice at the time was to dispose of excess ammunition by dumping it at sea.

****No mention was found of "Operation Roundup" in the Honolulu newspaper files.

APPENDIX A

SIDE SCAN SONAR MOSAICS

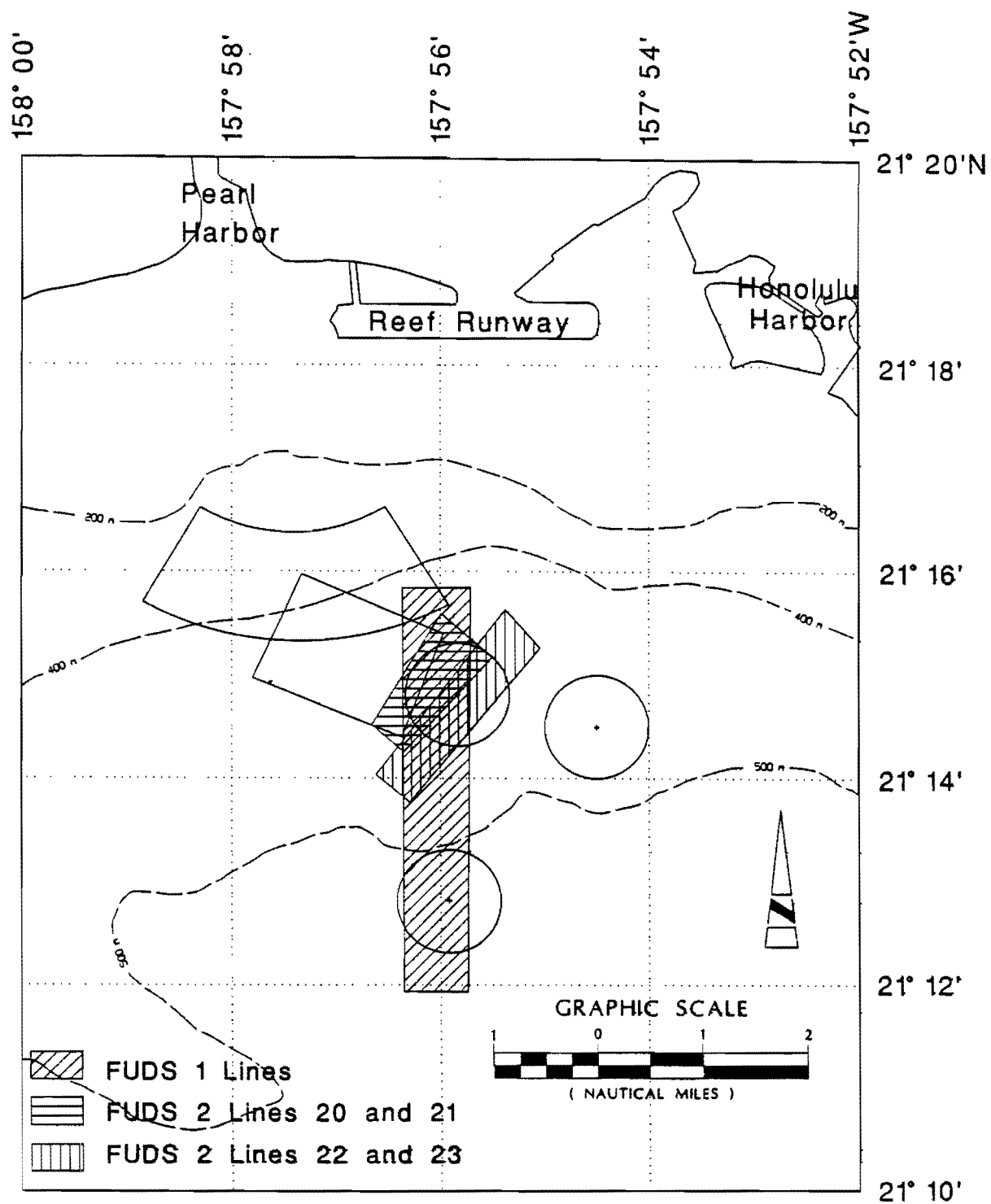
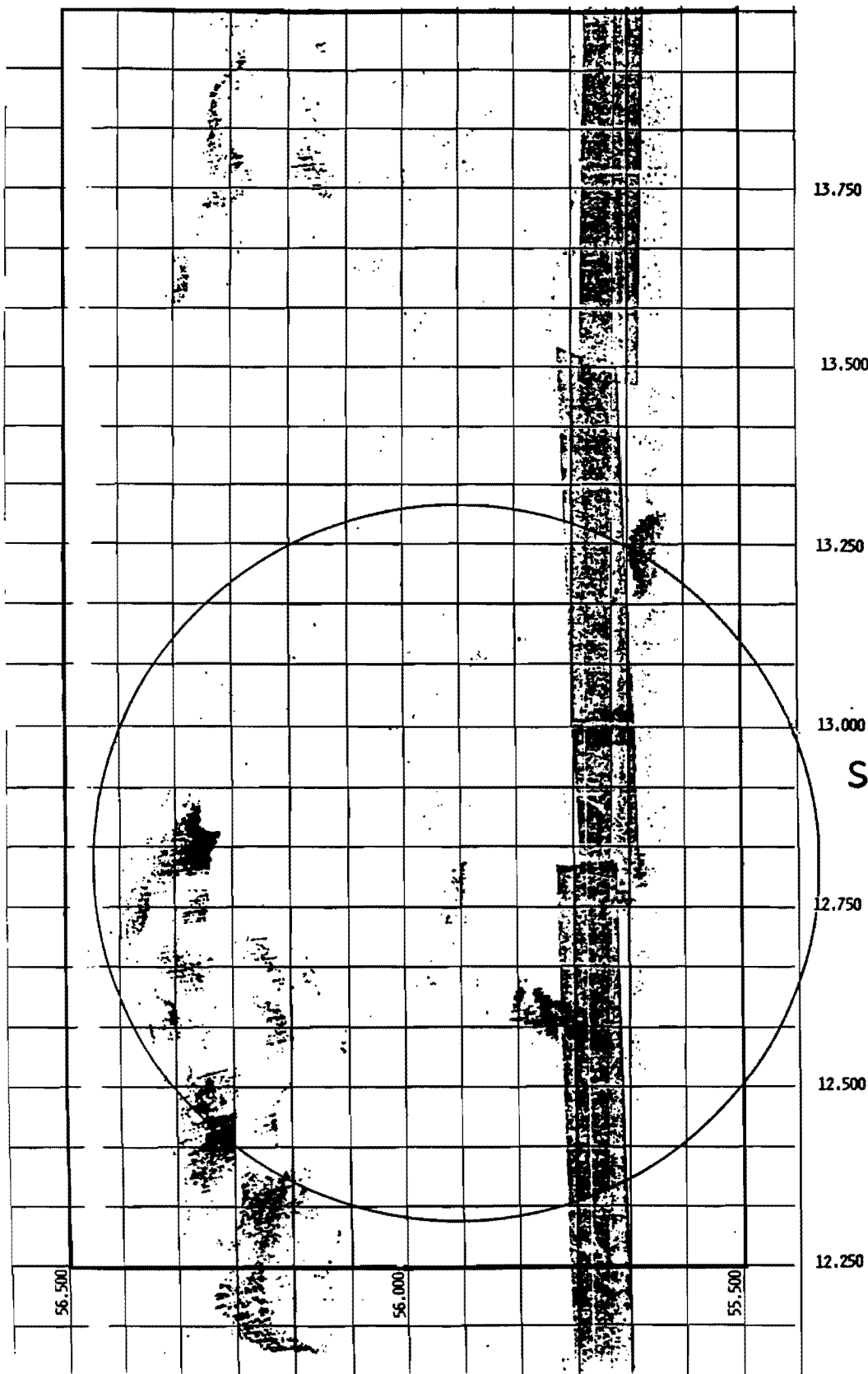


Figure 6. Areas covered by all side scan sonar mosaics taken in the vicinity of the FUDS Study Site 3 (H09HI0466) and FUDS Study Site 3A (H09HI0467).



SITE 3A

FORMERLY USED DEFENSE SITE 3A
NO. H09HI0467

R/V KILA NOVEMBER 16, 1994

EG&G DF - 1000 SIDE SCAN SONAR

GEODAS PROCESSING

SHOWN WITHOUT LAYBACK

APPENDIX B

VIDEO IMAGES OF ORDNANCE AND VOICE TRANSCRIPTS

FUDS/FOCUS Video/Ordnance Locations				
Site 3A				
Item No.	Description	Longitude	Latitude	Survey
		(157 deg)	(21 deg)	
1	Naval Projectile, 8" to 16", High-Capacity Round.	56.00	12.86	9/28/94
2	Large Cylinder, Possibly A/C Rocket Motor or Container.	56.03	12.90	9/28/94
3	Projectile.	56.46	13.40	8/15/95
4	Aircraft Rocket Launcher.	56.49	13.41	8/15/95
5	Projectile.	56.22	13.46	8/15/95
6	Barrage Rocket.	56.22	13.46	8/15/95
8	7.2" Barrage Rocket, a.k.a. "Mousetrap."	55.99	13.50	9/28/94
8	Linked Ammunition.	56.17	13.48	8/17/95
9	Naval Projectile, 8" to 16".	55.98	13.51	9/28/94
10	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.98	13.51	9/28/94
11	M 26 Flare Bomb, expended.	55.97	13.52	9/28/94
12	M 26 Flare Bomb, expended.	55.96	13.52	9/28/94
13	M 26 Flare Bomb, expended.	55.95	13.53	9/28/94
14	Large Cylinder, Possibly A/C Rocket Motor or Container.	55.90	13.55	9/28/94
15	Canister, Possibly 20/40 mm AAA. Probably Empty.	55.89	13.56	9/28/94
16	Ammo Box With Growth or Spillage.	55.88	13.57	9/28/94
17	Rocket Motor.	55.80	13.55	8/15/95
18	Rocket Launcher--Multiple Tubes.	55.78	13.56	8/15/95
19	Rocket Motor.	55.66	13.64	9/28/94
20	Rocket Motor.	55.66	13.64	9/28/94
21	Munitions Pod With Fins.	55.65	13.64	9/28/94
22	Munitions Pod With Fins, No ID.	55.63	13.65	9/28/94

Table 1. Location and description of ordnance video taped during FOCUS transects and HURL surveys. Ordnance identified by Donaldson Enterprises.

**INSERT
VIDEO IMAGES**

HURL Dive Voice Transcripts

P5-200. Pisces V. July 27, 1992 21° 16.0' N. Lat. 157° 58.0' W. Long.

Carter: We're right over it, a bomb.

Larkin: That looks like a shell out of a battleship, one of those big 16-inch, boy that'll make a big bang.

Carter: What's the depth charge?

Larkin: They rolled them right off of something because they're nicely spaced.

Kerby: Could be, because it looks like those two rings would lay in a track.

Larkin: And roll right off the back of the destroyer.

Kerby: But normally what they had was just a regular....

Carter: Early in the war it's hard to say what they had.

Carter: There's another one of them warheads.

Kerby: There's a shell....

Carter: There's a big shell....

Carter: There's a bomb with the shell next to it.

Larkin: Either we're right back on the bomb road or there are literally bombs every few feet down here.

(See Photos 36 and 40)

Larkin: There's a bullet, look at the size of that shell.

Carter: Something straight out, a shell looks like.

(See Photo 42)

Carter: Here's the shell right here.

Carter: There's a big 16 inch shell, it looks like it's used.

Carter: There's a bomb, depth charge.

(See Photos 33 and 38)

- Carter: It's a bomb with a Chaunax on it.
- Larkin: ...probably mustard dust bombs or something that they brought out here to get rid of.
- Kerby: I'm really surprised too. I think the areas we dived up closer had a lot more junk, not so much airplanes as bombs.
- Carter: That's a hedgehog, it launches like a rocket out of a launcher.
- Carter: The same shell.
- Larkin: Or is it a front of a torpedo?
- Carter: Nah, 16 incher.
- Larkin: That's a 16 inch shell, I know it's from a battleship. Big stuff.
- Larkin: Under a 16 inch shell too.

82-87. Makali'i. May 3, 1982 21° 16.3' N. Lat. 157° 54.8' W. Long.

(See Photos 29, 30, 31, 32)

- Bartko: Take a look at that. You can see down there. It's a nose cone from a projectile.
- Dollar: ...That's pretty clear the way it's just sitting there. It's really interesting how these little old objects that have obviously been down here for a long time aren't covered at all....
- Bartko: ...Some of those big heavy objects look like some of those mines.

(See Photo 30)

- Bartko: Steel objects of some kind, projectiles, pointed on one end.

(See Photo 41)

- Dollar: Whole pile of them...looks like torpedoes. Some of them 3 feet long, about four of them laying on top of one another.

Quick Look Report 82-82. Makali'i. April 23, 1982. 21° 16.7' N/157° 56.7' W.

"Also many debris items (such as depth charges) were sitting in depressions, suggesting that strong currents may be causing large or heavy rocks/obstacles to settle."

"A considerable amount of trash, debris, discarded munitions, and cable litter the bottom in all areas."

"Unexploded munitions are also scattered over much of the bottom."

"Most common debris: boxes, cables, coffee cups, plastic sheets, pipe, munitions, machinery, wire, battle helmets...."

